

# ABSTRACTS

## VIII Iberian Primatological Conference

### VIII IBERIAN PRIMATOLOGICAL CONFERENCE



Evolution, behaviour and conservation:  
Homage to Professor *Jordi Sabater Pi*

Barcelona, October 5-8, 2022

**Table of Contents**

Organizing Committee ..... 3

Scientific Committee ..... 4

Plenary & Invited Speakers..... 4

Schedule ..... 6

Poster list ..... 12

Abstracts ..... 15

Authors..... 63

## **Organizing Committee**

### **President**

Ruth Dolado – Universitat de Barcelona

### **Secretary**

Mercedes Mayo-Alesón – Universitat de Barcelona & Asociación Primatológica Española

### **Vocals**

Víctor Beltrán Francés – Universidad Veracruzana & Asociación Primatológica Española

Catarina Casanova – Universidade de Lisboa & Associação Portuguesa de Primatologia

Dietmar Crailsheim – Fundació MONA & Asociación Primatológica Española

Sergio Díaz – Universidad Autónoma de Madrid

Gloria Fernández Lázaro – Universidad Autónoma de Madrid, Universidad Complutense de Madrid & Asociación Primatológica Española

Ana Fidalgo – Universidad Autónoma de Madrid & Asociación Primatológica Española

Lisieux Fuzessy – CREAM, Centre for Ecological Research and Forestry Applications

Jordi Galbany – Universitat de Barcelona & Asociación Primatológica Española

Elisa Gregorio Hernández – AAP Primadomus & Asociación Primatológica Española

Miquel Llorente – Universitat de Girona & Asociación Primatológica Española

Tânia Minhós – Universidade NOVA de Lisboa & Associação Portuguesa de Primatologia

Maria Padrell – Universitat de Girona & Asociación Primatológica Española

Vicenç Quera – Universitat de Barcelona

David Riba – Universitat de Girona & Asociación Primatológica Española

Francesc Salvador Beltrán – Universitat de Barcelona

Natàlia Sellés Guillaumes – Asociación Primatológica Española

## Scientific Committee

Sara Álvarez-Solas – Universidad Regional Amazónica Ikiam & Asociación Primatológica Española

Catarina Casanova – Universidade de Lisboa & Associação Portuguesa de Primatologia  
Montserrat Colell – Universitat de Barcelona

Susana Costa – Associação Portuguesa de Primatologia

Sergio Díaz – Universidad Autónoma de Madrid

Gloria Fernández Lázaro – Universidad Autónoma de Madrid, Universidad Complutense de Madrid & Asociación Primatológica Española

Maria Ferreira da Silva – Associação Portuguesa de Primatologia

Ana Fidalgo – Universidad Autónoma de Madrid & Asociación Primatológica Española

Jordi Galbany – Universitat de Barcelona & Asociación Primatológica Española

Miquel Llorente – Universitat de Girona & Asociación Primatológica Española

Tânia Minhós – Universidade NOVA de Lisboa & Associação Portuguesa de Primatologia

Joana Roque de Pinho – Associação Portuguesa de Primatologia

Sònia Sánchez – Universidad Veracruzana & Asociación Primatológica Española

Cecilia Veracini – Associação Portuguesa de Primatologia

## Plenary & Invited Speakers

### Montserrat Colell

Profesora titular de etología y primatología. Dept. Psicología Clínica y Psicobiología, Universidad de Barcelona.

«Jordi Sabater Pi. Pasión por la vida, compromiso con la naturaleza»

Roundtable on Jordi Sabater Pi.

Speakers: **Oriol Sabater, Montserrat Colell, Carles E. Riba Campos, Margarida Genera i Monells.** Chairman: **Carles E. Riba Campos**

**Phyllis Lee**

Emeritus Professor, Stirling University, Scotland, UK

«Primate social evolution: individuals to groups to communities»

**Susana Carvalho**

Primate Models for Behavioural Evolution Lab, University of Oxford, UK

«From Primate Archaeology to Primate Cultural Heritage: dispatches from a field primatologist»

**Stephen Nash**

Adjunct Professor in the Departments of Anatomical Sciences and Art at Stony Brook University, on Long Island, New York, USA

«The Importance of Observational Drawing as a Research Tool: Jordi Sabater Pi and the Tradition of the Scientist-Illustrator»

**Volker Sommer & Matilda Brindle**

Department of Anthropology, University College London, UK

«Spanking the monkey. Form and function of primate masturbation»

**Iván Puga**

Center for Modelling Social Systems (CMSS) at NORCE, Kristiansand, Norway

«Agent-based models of primate social behaviour»

**Toni Pou**

Escritor científico, profesor de comunicación científica en la Universidad de Vic y autor de una biografía de Jordi Sabater Pi basada en las cartas que escribió desde Guinea.

«Cartas desde África: la pasión y el activismo científico de Jordi Sabater Pi»

## Schedule

### Day 1

Time		5th October, Wednesday	
8:30-9:30	Registration and welcome breakfast		
10:00-10:30	<b>Welcome and opening session</b> President Org. Com. + President APE + President APP		
10:30-11:30	<b>OPENING CONFERENCE</b> <b>Jordi Sabater Pi. Pasión por la vida, compromiso con la naturaleza</b>	<b>Montserrat Colell</b> <b>Universitat de Barcelona</b>	
11:30-13:00	<b>ROUNDTABLE ABOUT PROF. JORDI SABATER PI</b>	<b>Montserrat Colell, Carles Riba, Oriol Sabater, Margarida Genera</b>	
13:00-15:30	Transfer to Campus Mundet + Lunch time		
15:30-16:00	<b>INVITED PRESENTATION</b> <b>The Importance of Observational Drawing as a Research Tool: Jordi Sabater Pi and the Tradition of the Scientist-Illustrator</b>	<b>Stephen D. Nash</b> <b>Stony Brook University</b>	
16:00-16:45	Coffee break + Poster Session 1		
16:45-18:25	Oral Presentations: Session 1 - Behavioural ecology		
16:45-17:05	<i>Eco-evolutionary aspects of plant-lemur interactions</i>	<u>Lisieux Fuzessy</u> , Daniel Sol, Miguel Verdú	
17:05-17:25	<i>Chimpanzee (<i>Pan troglodytes verus</i>) baobab (<i>Adansonia digitata</i>) pounding: A new report from Dindéfelo, Senegal</i>	* <u>Carlota F. Galán-Plana</u> , Andreu Sánchez-Megías, Justinn Renelies-Hamilton, Manuel Llana, Laia Dotras, Jordi Galbany, R. Adriana Hernandez-Aguilar	
17:25-17:45	<i>Seasonal variability in group sizes of the Gashaka chimpanzees</i>	<u>Gonçalo Jesus</u> , Umaru Bubba, Volker Sommer	
17:45-18:05	<i>Savanna Chimpanzees (<i>Pan troglodytes verus</i>) in Guinea use caves: New data from Sabe</i>	<u>Marta Marcos-Nistal</u> , <u>Carlota F. Galán-Plana</u> , María C. Gallego-Acero, Laia Dotras, Jordi Galbany, Manuel Llana, Amanda Barciela, R. Adriana Hernandez-Aguilar	

\*Denotes participation in student competition

---

18:05-18:25	<i>Chimpanzee (Pan troglodytes verus) Army Ant (Dorylus spp.) foraging: A new study from Dindefelo, Senegal</i>	* <u>Andreu Sánchez-Megías</u> , Carlota F. Galán-Plana, Nadia Mirghani, Laia Dotras, Jordi Galbany, Manuel Llana, Adrián Arroyo, Justinn Renelies-Hamilton, R. Adriana Hernandez-Aguilar
-------------	---	--

<b>18:30-19:30</b>	<b>Visit Sabater Pi Collection</b>
--------------------	------------------------------------

---

**Day 2**

Time	6th October, Thursday	
<b>9:00-10:00</b>	<b>PLENARY SESSION</b>	<b>Em. Prof. Phyllis Lee</b>
	<i>Primate social evolution: individuals to groups to communities</i>	<b>Stirling University</b>
<b>10:00-10:45</b>	<b>Coffee break + Poster Session 2</b>	
<b>10:45-12:05</b>	<b>Oral Presentations: Session 2 - Social behaviour, development and personality</b>	
10:45-11:05	<i>Species-specific management strategies while living in all-male groups: chimpanzees vs gorillas</i>	<u>Nerea Amezcua-Valmala</u> , Catarina Casanova, Fernando Colmenares
11:05-11:25	<i>Vigilance behaviour, fission-fusion dynamics and subgroup composition in wild spider monkeys (Ateles geoffroyi)</i>	* <u>Chiara Bernardi</u> , Sara Valdivieso, Federica Amici, Filippo Aureli, Miquel Llorente
11:25-11:45	<i>Play- and real-fight in adult chimpanzees (Pan troglodytes): how do they structurally differ?</i>	<u>Giada Cordoni</u> , Giulia Ciarcelluti, Altea Pasqualotto, Annarita Perri, Veronica Bissiato, Ivan Norscia
11:45-12:05	<i>Grooming and proximity network across different groups of captive Spajus apella</i>	<u>Sergio Díaz González</u> , Susana María Sánchez Rodríguez, Pablo Caso Parajon, Andra Paula Sticea Covaciu, Manuel José Esparza Baños, María Alicia Luján Rodríguez, Paula González Bermejo, Ana Fidalgo de las Heras
<b>12:05-12:10</b>	<b>Minibreak</b>	
<b>12:10-13:30</b>	<b>Oral Presentations: Session 3 - Social behaviour, development and personality</b>	
12:10-12:30	<i>Long-term resident male influence on dominance patterns on macaque societies</i>	<u>Ruth Dolado</u> , Hélène Meunier, Sébastien Ballesta, Marc

---

		Joosten, Laura Mármol, Mireia Olivé; Francesc S. Beltran
12:30-12:50	<i>Hierarchy model based on affiliative behaviours of the group of tufted capuchin monkeys (Sapajus apella) of the Madrid Zoo Aquarium</i>	* <u>Manuel José Esparza Baños</u> , Andra Paula Sticea Covaciu, Sergio Díaz Gonzalez Ana Fidalgo de las Heras
12:50-13:10	<i>Personality assessment in great apes: a comparative approach between behavioural coding and trait rating</i>	* <u>Albert Giberta</u> , Maria Padrell, Federica Amici, Sara Ortín, Yulán Úbeda, Miquel Llorente
13:10-13:30	<i>Could the local factors modified the social parameters in semi-freedom macaques groups? Exploratory study in semi-free ranging Macaca tonkeana and Macaca fascicularis groups.</i>	<u>Laura Mármol</u> , Hélène Meunier, Ruth Dolado, Francesc S. Beltran
<b>13:30-15:00</b>	Lunch	
<b>15:00-15:30</b>	<b>INVITED PRESENTATION</b> <b>Agent-based models of primate social behaviour</b>	<b>Iván Puga-González</b> <b>Center for Modelling Social Systems (CMSS) at NORCE</b>
<b>15:30-16:00</b>	<b>Coffee break + Poster Session 3</b>	
<b>16:00-18:00</b>	<b>Oral Presentations: Session 4 - Conservation and Welfare</b>	
16:00-16:20	<i>Wild plant overlap between sympatric humans and non-human primates in a continuous rainforest and an anthropogenic landscape</i>	* <u>I. Aleixo-Pais</u> , F. Borges, C. Ramos, B. Barca, B.S. Turay, M. Swaray, M. Cassama, I.T. Camara, M.J. Ferreira da Silva, A. Frazão-Moreira, M.W. Bruford, T. Minhós
16:20-16:40	<i>Primate management in urban conditions living</i>	<u>Sara Álvarez Solas</u> , Renata Rodríguez, Victoria Viter, Francisco Valladares, Gloria Corradini, Camila Tamia Torres, Daniela Narvaez, Karla Vera, Alejandro Peña Bucheli, Anna Maria Miralles Alvarez
16:40-17:00	<i>Two colobine monkeys in two West African forests – does the conservation of the ecosystem influence the primates’ evolutionary potential?</i>	* <u>Filipa Borges</u> , Tânia Minhós, Bárbara Parreira, Rúben Oliveira, Isa Aleixo Pais, Fabian Leendertz, Roman Wittig, Carlos Fernandes, Guilherme Marques, Miguel Duarte, Michael Bruford, Maria Joana Ferreira da Silva, Lounès Chikhi
17:00-17:20	<i>What do we currently know about mona monkeys (Cercopithecus mona) in São Tomé and Príncipe Islands?</i>	<u>C. Casanova</u> , G. Jesus



<b>17:20-17:25</b>	<b>Minibreak</b>	
<b>17:25-18:40</b>	<b>Oral Presentations: Session 5 - Conservation and Welfare</b>	
17:25-17:45	<i>Eight years of guenon conservation genetics in Guinea-Bissau, West Africa: outcomes and future perspectives</i>	* <u>Ivo Colmonero-Costeira</u> , Isa Aleixo Pais, Filipa Borges, Susana Costa, Tânia Minhós, Mike William Bruford, Maria Joana Ferreira da Silva
17:45-18:05	<i>Describing the consumption of primate-meat with alcoholic drinks in Guinea-Bissau using social data and meta-barcoding techniques</i>	<u>Maria Joana Ferreira da Silva</u> , Mariato Camará, Bastian Egeter, Tania Minhós, Michael W Bruford, Raquel Godinho
18:05-18:25	<i>Conservation genetics of the red colobus monkeys from Gola Rainforest National Park, Sierra Leone</i>	<u>Tânia Minhós</u> , Filipa Borges, Isa Aleixo-Pais, Maria Ferreira da Silva, Benjamim Barca, Brima Turay, Darya Sevastópolka
18:25-18:45	<i>Preliminary results on the genetic diversity and population connectivity of Guinea baboons' desert populations in Mauritania</i>	* <u>Cristian Pizzigalli</u> , Maria Joana Ferreira da Silva, Andack Saad Sow, Hamidou Dieng, Raquel Godinho, Orly Razgour, José Carlos Brito
<b>18:45-19:30</b>	<b>Visit Sabater Pi Collection</b>	

### Day 3

7th October, Friday		
Time	PLENARY SESSION	
9:00-10:00	<i>From Primate Archaeology to Primate Cultural Heritage: dispatches from a field primatologist</i>	Dr. Susana Carvalho University of Oxford
10:00-10:45	Coffee break + Poster Session 4	
<b>10:45-12:20</b>	<b>Oral Presentations: Session 6 - Conservation and Welfare</b>	
10:45-11:05	<i>Leprosy in wild chimpanzees in Cantanhez National Park, Guinea-Bissau</i>	* <u>Marina Ramon</u> , Harriet R Herridge, Livia V Patrono, Elena Bersacola, Joana Bessa, Américo Sanhá, Maimuna Jaló, Alexandra J D Dell, Isa Aleixo-Pais, Camille Bonneaud, Sébastien Calvignac-Spencer, Fabian H. Leendertz, Michael W Bruford, Kimberley J Hockings

11:05-11:20	<i>Ecological and cultural aspects of the human – nonhuman primate interface in the island of Santiago (Cape Verde)</i>	<u>Cecilia Veracini</u>
11:20-11:40	<i>Abnormal and anxiety-related behaviours in zoo chimpanzees: quantitative, qualitative and topographical analysis</i>	* <u>Eva Corral</u> , Helena Garcia-Saura, Melissa Guinot, Sandra Castells, Josep Maria Alonso, Maria Teresa Abelló, Miquel Llorente
11:40-12:00	<i>The environmental enrichment of primate enclosures in Spanish zoos thirteen years after the introduction of the Law 31/2003</i>	<u>Federico Guillén-Salazar</u> , Gemma Pons-Salvador
12:00-12:20	<i>Cognitive enrichment in socially-housed chimpanzees: behavioural and welfare outcomes of a novel tool-based device</i>	* <u>Maria Padrell</u> , Federica Amici, Maria Pau Córdoba, Miquel Llorente
<b>12:20-12:30</b>	<b>Minibreak</b>	
<b>12:30-13:30</b>	<b>Oral Presentations: Session 7 - Cognition and behavioural neuroscience</b>	
12:30-12:50	<i>Social contagion in captive chimpanzees: presence and modulating factors</i>	<u>Ivan Norscia</u> , Altea Pasqualotto, Giulia Ciarcelluti, Elisa Demuru, Miquel Llorente, Giada Cordoni
12:50-13:10	<i>PRIMLAT: Hand preferences for bimanual coordinated tasks in nonhuman primates: a comparative study in 22 primate species</i>	<u>Miquel Llorente</u> , Dmitry Ocunski, Leandre Murhula, Itsaso Vélez del Burgo, Laura Simó
13:10-13:30	<i>Manual laterality in coordinated bimanual tasks in non-human primates: A systematic review and meta-analysis</i>	<u>Cristina Soto</u> , José M.M. Gázquez, Miquel Llorente
<b>13:30-15:00</b>	<b>Lunch</b>	
<b>15:00-15:30</b>	<b>INVITED PRESENTATION</b>	<b>Volker Sommer and Matilda Brindle</b>
	<b>Spanking the Monkey. Form and Function of Primate Masturbation</b>	<b>University College London</b>
<b>15:30-16:50</b>	<b>Oral Presentations: Session 8 - Cognition and behavioural neuroscience</b>	
15:30-15:50	<i>Comparative cognition between chimpanzees and children aged 1 to 3 years on the combinatorial manipulation of objects</i>	<u>Batista Ramírez</u> , M <sup>a</sup> Nazaret, Rivera Rey, David, Escribano Durán, Begoña
15:50-16:10	<i>Look into my eyes: Japanese macaque (<i>Macaca fuscata</i>) perception of human gaze</i>	<u>Anna Albiach-Serrano</u> , Alba Castellano-Navarro, Emilio Macanás-Martínez, Zhihong Xu, Federico Guillén-Salazar, Andrew J. J. MacIntosh, Federica Amici
16:10-16:30	<i>Emotional contagion in wild spider monkeys (<i>Ateles geoffroyi</i>)</i>	* <u>Sara Valdivieso</u> , Chiara Bernardi, Miquel Llorente, Filippo Aureli, Federica Amici

16:30-16:50	<i>Development of vocal sequences: structural complexity and combinatorial potential in wild chimpanzees (Pan troglodytes verus)</i>	<u>*Tatiana Bortolato</u> , Roger Mundry, Roman M. Wittig, Cédric Girard-Buttoz, Catherine Crockford
<b>16:50-17:30</b>	<b>Oral Presentations: Session 9 - Biology, evolution and phylogeny</b>	
16:50-17:10	<i>Quantitative analysis of hand muscle asymmetries in chimpanzees</i>	<u>*Marcel García-Cuesta</u> , Aroa Casado Rodríguez, Juan Francisco Pastor, Félix de Paz, Roberto Cabo, Josep Maria Potau Ginés
17:10-17:30	<i>Social rank explains tooth wear in female Amboseli baboons</i>	<u>Morena Rodríguez</u> , Andrea Velasco, Elizabeth A. Archie, Jenny Tung, Susan C. Alberts, Jordi Galbany
<b>17:30-18:10</b>	<b>Oral Presentations: Session 10 - Methodology</b>	
17:30-17:50	<i>The figure of Jordi Sabater Pi. Some bio-historiographical data regarding his activity as a scientific divulgator and the origins of humanity</i>	<u>Margarida Genera i Monells</u>
17:50-18:10	<i>Human evolution through the look of some paradigmatic drawers</i>	<u>Margarida Genera i Monells</u>
<b>18:10-18:40</b>	<b>INVITED PRESENTATION</b> <b>Cartas desde África: la pasión y el activismo científico de Jordi Sabater Pi</b>	<b>Toni Pou</b> <b>Journalist</b>
<b>18:40-19:25</b>	Closing ceremony and student awards	
<b>19:25-21:00</b>	Relax and free time	
<b>21:00</b>	Farewell dinner	

<b>Time</b>	<b>8th October, Saturday</b>
10:00-14:00	<b>VISIT</b> <b>BARCELONA ZOO</b>

## Poster list

Authors	Title	Poster number
Samba Macina, Laia Dotras, Manuel Llana, R. Adriana Hernandez-Aguilar, Papa I. Ndiaye	Savanna Chimpanzee ( <i>Pan troglodytes verus</i> ) Nesting Tree Species Abundance in Dindefelo (Senegal): Implications for conservation	1
Amara Quirós-Sánchez, Ignacio Martínez Mendizábal, Ángeles Sánchez-Andrés, Mercedes Conde-Valverde	Phylogenetic study of the features of semicircular canals in Homininae subfamily using micro CT images and 3D virtual models	2
Alejandro Romero, Stéphanie Torrijo-Boix, Alejandro Pérez-Pérez, Jordi Galbany	Patterns of variation in dental morphometrics among <i>Pan</i> species	3
Yasmina Avià, Aroa Casado, Juan Francisco Pastor, Félix de Paz, Roberto Cabo, Josep Maria Potau, Elisabeth Cuesta-Torralvo	Morphological characterisation of the temporomandibular joint in chimpanzees and humans	4
Marcel García-Cuesta, Yasmina Avià, Elisabeth Cuesta-Torralvo, Josep Maria Potau, Aroa Casado	Functional anatomy of the chimpanzee upper limb in Barcelona Zoo	5
Potau JM, Casado A, García M, Cabo R, Pastor JF	Quantitative analysis of rotator cuff muscles in non-hominoid primates	6
*Laia Dotras, Amanda Barciela, Manuel Llana, Nadia Mirghani, Carlota F. Galán-Plana, Jordi Galbany, R. Adriana Hernandez-Aguilar	First evidence of the endangered King colobus ( <i>Colobus polykomos</i> ) in Senegal	*7
Luís Nhaga, Rui Sá, Cecilia Veracini	An ethnoprimateological study about the bushbabies (Galagidae, Gray 1825) of Guinea-Bissau	8
Ferreira da Silva, MJ, Minhós T., Sampaio-Dias, S.	Lessons learned during the News for Nature/PRIMACTION project: Increasing the visibility of current Guinea-Bissau non-human primates' conservation in the media	9
*Ana Ostos-Ruano, Jaume Fatjó, Montserrat Franquesa-Soler	Are human attitudes on the way to a sustainable coexistence with sympatric nonhuman primates? A systematic review	*10
*Sara Cardoso, R. Adriana Hernandez-Aguilar, Laia Dotras, Nadia Mirghani, Manuel Llana, Amanda Barciela, Jordi Galbany	Implementing a photogrammetric technique for measuring body size of wild chimpanzees from camera trap video footage	*11

\* Denotes participation in student competition

Blanca Martí de Ahumada, Carles Puche, Suani Armisen, Miquel Llorente	New master training programme in scientific illustration in the natural sciences	12
*Maria Padrell, Federica Amici, Miquel Llorente	Eysenck's personality model in captive chimpanzees: assessment of a larger sample	13
Miquel Llorente, Suani Armisen	A decade of the Master's Degree in Primatology at the University of Girona	14
Melissa Guinot, Eva Corral, Helena García-Saura, Sandra Castells, Miquel Llorente	Orangutan Welfare Evaluation Project: Establishing a longitudinal welfare monitoring project at the Barcelona Zoo	15
Miquel Llorente, Jaume Fatjó, Carles Rostán, Yulán Úbeda	Personality and psychological disorders are related in ex-pet and ex-performer chimpanzees. A preliminary investigation.	16
Dmitry Ocunski, Miquel Llorente, Gloria Fernández-Lázaro	Abnormal repetitive behaviours and risk factors in <i>Lemur catta</i>	17
Josep Maria Alonso, Maria Teresa Abelló	Historical review of Barcelona Zoo primate research and conservation actions (2009-2021)	18
María Alicia Luján Rodríguez, Paula González Bermejo, Sergio Díaz González, Ana María Fidalgo de las Heras	Personality and behavioural stability in robust capuchin monkeys ( <i>Sapajus apella</i> ) after a group change in Faunia	19
Paula González Bermejo, María Alicia Luján Rodríguez	Temporal stability of social networks in captive tufted capuchin monkeys ( <i>Sapajus apella</i> ) after the separation of part of the group	20
*Andra Paula Sticea Covaciu, Manuel José Esparza Baños, Sergio Díaz Gonzalez, Ana Fidalgo de las Heras	Analysis of the relation between dominance rank and proximity in brown capuchin monkeys ( <i>Sapajus apella</i> ) at the Zoo Aquarium of Madrid	*21
Ester Orient, Federico Guillén-Salazar	Social compatibility in an all-male group of captive chimpanzees ( <i>Pan troglodytes</i> ).	22
Nerea Amezcua-Valmala, Ester Orient Pérez, Catarina Casanova, Federico Guillén-Salazar, Fernando Colmenares	Chimpanzees in captivity: does the demographic structure affect the time allocated to different activities?	23
Hugo Cano-Fernández, Josefina Zapata	PrimLab: A new model to understand primate spatial behaviour	24
*Fabiana P Corcione, Jordi Galbany, Carles-Enric Riba Campos	Mother-Infant Interactions in Western Lowland Gorillas ( <i>Gorilla gorilla gorilla</i> ) at the Barcelona Zoo: influence of physical contact and maternal transport style	*25
Ruth Dolado, Elisabet Gimeno, Francesc S. Beltran	Effects of long-term resident males among macaques: An agent-based model.	26

Raquel Martínez Gutiérrez	Behavioural response to maternal loss in captive juvenile Western Lowland Gorillas ( <i>Gorilla gorilla gorilla</i> ).	27
*Jose Gil Dolz, Dietmar Crailsheim, David Riba	Do neighbours matter? How intergroup interactions affect the social networks of adjoining chimpanzee groups	*28
Arnau Pascual, Dietmar Crailsheim, Elfriede Kalcher-Sommersguter, David Riba	Alterations of group composition in former pet and entertainment chimpanzees: impact on behaviour and social network	29
Montserrat Ubach-Tarrés, Cecilia Veracini	Creating a microclimate for marmosets and tamarins: the example of the Darwin Foundation	30
*Martí Masip, Olga Feliu, Carme Maté, Sònia Sánchez-López, Dietmar Crailsheim, Elfriede Kalcher-Sommersguter	Effects of the death of an intimately familiar group member on the behaviour of two former pet and entertainment chimpanzees.	*31
Antonio Andrés Herrero Reyes, Hugo Cano Fernández, José Galián, Gema Pardo, Josefina Zapata	Assessing food enrichment with live insects on four species of captive primates	32
*Iria Merino-Sánchez, Ana Pérez-Cembranos, Dietmar Crailsheim	Assessment of the occurrence of abnormal behaviours in chimpanzees housed at a primate rescue centre.	*33
Gema Benedicto Rodríguez, Hugo Cano Fernández, Josefina Zapata	Presence of “hair pulling” in non-human primates in captivity	34
*Kevin López-Leal, Adrián Arroyo, David Riba	Termite-mound task and tool-use behaviour in sanctuary-housed chimpanzees.	*35
*Jennifer Fernández García, Pablo R. Ayuso, Sònia Sánchez-López, Dietmar Crailsheim	Evaluation of rehabilitation and social integration of a former pet and entertainment chimpanzee: Case study of an elderly female chimpanzee	*36

## Abstracts

### Plenary & Invited Speakers

#### From primate archaeology to primate cultural heritage: Dispatches from a field primatologist

Susana Carvalho

*Primate Models for Behavioural Evolution Lab, University of Oxford.*

[arqscarvalho@gmail.com](mailto:arqscarvalho@gmail.com)

Pounding technology is ubiquitous in the archaeological record, from the Pliocene (ca. 3.3Ma) to present. Traditionally, these tools were neglected, due to their inner trait of being 'modified by use' and not 'prior to use', considered less optimal to understand cognitive complexity and technological evolution. Paradoxically, they allow for a rare comparative approach between human and non-human primate technology, including the use of stone and robust wooden tools to crack nuts. Over the past 15 years much progress was accomplished, both regarding the quality of the studies and the methods to analyse assemblages, but also with respect to what we know about the behaviours, socially and functionally, or the ecology that produces the damage we see and wish to interpret from the past. I will review the state of the art and discuss processes of tool selection, as well as the ecological variables affecting the location and formation of sites. I will discuss novel ideas paving the way to future developments, including current discussions about 'non-human primate cultural heritage'. Finally, I discuss similarities and differences between the human and non-human primate records and the hypothesis that our LCA (*Pan-Homo*, 7-12Ma), was already a tool-user.

#### Jordi Sabater Pi. Passion for life, commitment to nature

Montserrat Colell<sup>1,2</sup>

<sup>1</sup>*Dept of Clinical Psychology and Psychobiology. Faculty of Psychology, University of Barcelona.* <sup>2</sup>*Institute of Neurosciences, University of Barcelona.*

[mcolell@ub.edu](mailto:mcolell@ub.edu)

**Keywords:** Sabater Pi, primatology, primate ethology, ape cultures, chimpanzee tool use, great apes nesting

Jordi Sabater Pi was one of the leading researchers in Spain and one of the most important primatologists of the XX century. His scientific career is inseparable from his life trajectory. Self-taught, he arrived to Equatorial Guinea very young. His curiosity about life and nature developed into a great interest for animal behaviour and ethnic groups. His work led to extraordinary results on very different subjects as the tattoo's art in Fang people, or the biology of the Goliath frog, among others. However, his most important findings were on Primatology. He was a pioneer in the study of chimpanzee and gorilla behaviour. A major contribution was, in 1969, the discovery of a chimpanzee population using sticks as tools to capture termites in the Okorobikó mountains. As a result, he proposed, for the first time, the possible existence of material cultural areas in wild chimpanzees. He also studied African great apes nesting behaviour and behavioural ecology of several forest monkeys. In 1958, he discovered the world-famous albino gorilla, Snowflake, who became a symbol for Barcelona. Since 1976, he worked as Professor and researcher at the Faculty of Psychology at University of Barcelona, where he introduced Primate Ethology as a new subject.

## Primate social evolution: individuals to groups to communities

Phyllis C. Lee

*University of Stirling.*

[Phyllis.lee@stir.ac.uk](mailto:Phyllis.lee@stir.ac.uk)

**Keywords:** Grouping, social networks, dispersal modes, predation

Primates represent a mammalian order with great diversity in the observed associations between conspecifics, which we call sociality. Despite more than 60 years of study, many interesting questions about the nature and consequences of sociality remain to be explored. How do we know what is social? New techniques for describing coordination between individuals in time and space enable new distinctions and definitions. How do we define sociality and social systems? Perspectives from social network theory and emergent systems provide new insights. Can sociality be extended beyond conspecifics to other species? This question relates to the relatively common multi-species associations seen in nature, and ask whether the same techniques and models can be applied to these. Using examples from primate and non-primates, I will illustrate some of the problems and issues with what we as observers can describe as sociality, and highlight some of the remaining issues for new generations of biologists exploring social evolution in a comparative context, including the primate social specialists.

## The importance of observational drawing as a research tool: Jordi Sabater Pi and the tradition of the scientist-illustrator

Stephen D. Nash

*IUCN SSC Primate Specialist Group, Stony Brook University.*

[Stephen.Nash@stonybrook.edu](mailto:Stephen.Nash@stonybrook.edu)

**Keywords:** Observational and analytical drawing, Jordi Sabater Pi, conservation education, scientific illustration

Jordi Sabater Pi's contributions to the fields of primatology and ethology are immense, but he was also a gifted artist who used observational drawing to better his understanding and appreciation of nature.

This presentation will assess the images he produced and place them in a stylistic and historical context with those of other people who have ignored the artificial boundaries between art and science.

## Jordi Sabater Pi. Scientific passion and advocacy

Toni Pou

*Science writer and professor of Science Communication at University of Vic.*

[tonipou@gmail.com](mailto:tonipou@gmail.com)

**Keywords:** Sabater Pi, Equatorial Guinea, Africa, letters

Several books have been written about Professor Jordi Sabater Pi, world pioneer of scientific research on wild gorillas and chimpanzees. All of them are based on conversations with him, that is, on his memories of the almost thirty years he lived in what was then called Spanish Guinea. My research aims to reconstruct



the life of Professor Sabater Pi not from memories but from the letters he wrote and received in Africa. This reconstruction has taken the form of a book founded by the Barcelona City Council and the University of Barcelona, in which, thanks to a careful analysis of the aforementioned letters, new aspects of Professor Sabater Pi's life are revealed. At the same time, already known aspects of his life get a new deeper light and are qualified in a closer way to what really happened. In the year of his centenary, the book therefore gives a faithful and complete account of Professors Sabater Pi's life and scientific career, in which passion for nature and scientific advocacy play a fundamental role.

## Agent-based models of Primate social behaviour

Ivan Puga-Gonzalez

*Center for Modelling Social Systems at Norwegian Research Center (NORCE).*

[ivanpuga@gmail.com](mailto:ivanpuga@gmail.com)

**Keywords:** Agent-based modelling; Grooming; Fighting; Behaviour exchange;

Whereas the use of agent-based modelling to understand complex social systems in social sciences, insects, fish, etc., has exploded in the last decades; its use remains scarce in primatology. Here, I illustrate how agent-based modelling can be used to understand and advance our knowledge of complex social behaviour in primates. I present the results of several different agent-based models that have been shown to reproduce patterns of reciprocity and interchange of behaviour as observed in societies of macaques. Critically, the underlying cognitive assumptions in each of these models vary from simplest (symmetry-based reciprocity) to complex (emotional-bookkeeping). Because these models reproduce the same patterns, it is difficult to tell which model and underlying mechanism, if any, more accurately represents the empirical data. By simulating 14 groups (8 species) of macaques in each of the models, I analysed the emergent behaviour exchange and social network structure; and quantitatively compared empirical and models' results. Although some differences between models were noticeable, in general, no model fitted the empirical data better than the others, suggesting thus that some social process may be missing in the models. Hopefully, this talk will inspire researchers to adopt and use agent-based modelling in primate research.

## 'Spanking the Monkey': Form and function of primate masturbation

Volker Sommer & Matilda Brindle

*Department of Anthropology, UCL, London WC1H 0BW, UK.*

[v.sommer@ucl.ac.uk](mailto:v.sommer@ucl.ac.uk)

**Keywords:** masturbation; pathogen avoidance; postcopulatory sexual selection

Autosexual behaviour is common in many primate taxa, including humans. Nevertheless, its distribution across the order has not been comprehensively mapped, a shortcoming that impedes an assessment of potential evolutionary significance. We charted the distribution and forms of masturbation through extensive literature reviews and questionnaires, and reconstructed its evolutionary history via Bayesian phylogenetic analyses. We found that, while autosexual behaviour can be a non-functional substitute for allosexual interactions, many acts of genital self-stimulation seem to serve adaptive functions that fall broadly under two categories: avoidance of pathogen transmission (genital cleaning) and increasing the chances of fertilisation (females: attract mates via pheromones; facilitate sperm transfer by optimising the vaginal

milieu; males: attract mates via display of vigour; eliminate inferior sperm). In terms of implications for human public health, our finding that masturbation is ubiquitous throughout the primate order, practiced by wild-living members of both sexes and all age-groups is a strong counter-argument to voices who condemn human masturbation as 'unnatural'.



## Oral and poster presentations

### Look into my eyes: Japanese macaque (*Macaca fuscata*) perception of human gaze

Anna Albiach-Serrano<sup>1</sup>, Alba Castellano-Navarro<sup>1</sup>, Emilio Macanás-Martínez<sup>1</sup>, Zhihong Xu<sup>2</sup>, Federico Guillén-Salazar<sup>1</sup>, Andrew J.J. MacIntosh<sup>2</sup> & Federica Amici<sup>3,4</sup>

<sup>1</sup>*Ethology and Animal Welfare Section; Universidad Cardenal Herrera-CEU, CEU Universities, Spain.*

<sup>2</sup>*Primate Research Institute, Kyoto University, Japan.* <sup>3</sup>*Research Group Primate Behavioural Ecology, Department of Human Behaviour, Ecology and Culture, Max-Planck Institute for Evolutionary Anthropology, Germany.* <sup>4</sup>*Behavioural Ecology Research Group, Institute of Biology, Faculty of Life Science, University of Leipzig, Germany.*

[anna.albiach@uchceu.es](mailto:anna.albiach@uchceu.es)

**Keywords:** Japanese macaques, gaze sensitivity, gaze following, visual perspective, Theory of Mind

Others' gaze can be very informative in many ways and in varied situations. Detecting predators by spotting their eyes or following a conspecific's gaze to find resources are just some examples. Moreover, gaze is a window into others' mental states that allows predicting others' behaviour and act accordingly. We investigated how 49 free-living Japanese macaques from Koshima island responded to human gaze in three contexts: In Experiment 1 (Threat), they showed greater flight initiation distance and more threats towards a human that approached them while looking straight at them compared to when he showed an averted gaze. In Experiment 2 (Cooperation), they moved to enter the visual field of a human that provisioned them with food, as well as they showed sensitivity to his eyes being opened or closed. In Experiment 3 (Competition), the macaques did not prefer taking food hidden over food visible to a human competitor. We conclude from our results that Japanese macaques respond flexibly to human gaze, moving away from it in a threat context while seeking for it in a cooperation context. However, we found no evidence that Japanese macaques can take the visual perspective of a human competing with them over food.

### Wild plant overlap between sympatric humans and non-human primates in a continuous rainforest and an anthropogenic landscape

I. Aleixo-Pais<sup>1,2</sup>, F. Borges<sup>2,3,4,5</sup>, C. Ramos, B. Barca<sup>6</sup>, B.S. Turay<sup>7</sup>, M. Swaray<sup>7</sup>, M. Cassama, I.T. Camara, M.J. Ferreira da Silva<sup>1,4,8</sup>, A. Frazão-Moreira<sup>2,9</sup>, M.W. Bruford<sup>1</sup> & T. Minhós<sup>2,9</sup>

<sup>1</sup>*Organisms and Environment, School of Biosciences, Cardiff University, United Kingdom.* <sup>2</sup>*Centre for Research in Anthropology (CRIA – NOVA FCSH), Lisbon, Portugal.* <sup>3</sup>*Centre for Ecology and Conservation (CEC), University of Exeter, United Kingdom.* <sup>4</sup>*CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBio Laboratório Associado, Universidade do Porto, Portugal.* <sup>5</sup>*Instituto Gulbenkian de Ciência, Oeiras, Portugal.* <sup>6</sup>*Nature Metrics, Guildford, United Kingdom.* <sup>7</sup>*Gola rainforest National Park, Kenema, Sierra Leone.* <sup>8</sup>*BIOPOLIS Programs in Genomics, Biodiversity and Land Planning, CIBIO, Portugal.* <sup>9</sup>*Department of Anthropology, School of Social Sciences and Humanities, Universidade Nova de Lisboa, Lisbon, Portugal.*

[lsa.aleixopais@gmail.com](mailto:lsa.aleixopais@gmail.com)

**Keywords:** Wild resource use, human-wildlife coexistence, socio-ecological systems, biodiversity conservation, inter-disciplinary science

Non-human primates (NHP) and humans currently overlap extensively in tropical regions, sharing space and natural resources. To understand the complex social-ecological systems, semi-structured interviews and faecal sample molecular examination were used to evaluate the extent of wild plant use between co-existing humans, western chimpanzees (*Pan troglodytes verus*) and western red colobus (*Ptilocolobus badius*) in two west African national parks: Cantanhez NP (CNP, Guinea-Bissau) and Gola Rainforest NP (GRNP, Sierra Leone). Due to the nature of CNP (high levels of forest fragmentation and human presence), a higher dietary niche overlap between NHPs was expected than in the less anthropogenic forests of GRNP. Similarly, resource overlap between NHP and humans would be more pronounced in CNP. Diet characterisation was obtained with ITS2 plant marker high throughput sequencing for 62 *P. t. verus* and 308 *P. badius* samples, and the salience index determined the most important wild plants for 108 informants living adjacently or within the national parks. Generalised linear modelling of biological and social data revealed dietary variation in both national parks, and supported the predictions that all species would share more wild resources in landscapes where forest quality is diminished. This information is crucial for evidence-based primate and forest conservation.

## Historical review of Barcelona Zoo primate research and conservation actions (2009-2021)

J.M. Alonso & M.T. Abelló

*Research and in situ Conservation Department, Barcelona Zoo.*

[jmalonso@bsmsa.cat](mailto:jmalonso@bsmsa.cat)

**Keywords:** Barcelona Zoo, research, conservation, primates

The historical interest of primatological studies within the framework of the Barcelona Zoo could be considered unquestionable in the last 50 years. The work of Jordi Sabater-Pi supported by the Zoo in the 1960s and 1970s, the collaboration in the first rescues done in Catalonia in the 1980's and later on the collaboration with the Càtedra Sabater-Pi at the University of Barcelona have established an enduring involvement in the research and conservation of these species. In 2009, Barcelona Zoo created its Research and Conservation Programme, and between 2009 and 2021, 457 research and/or in situ conservation actions have been developed or facilitated. Of these, 21.5% (98) have focused their activity on primates, involving a total expenditure of €617,803. The primate groups that most effort has received are great apes (48) and cercopithecines (31). Chimpanzees (27) were the most studied species, followed by mangabeys (22) and gorillas (16). Over the same period, the scientific production associated with primates has accounted 25% (53/217) of the Zoo's scientific papers in peer-reviewed journals, and 22% (80/375) of the presentations at scientific conferences. It is also particularly noteworthy the interest about primates in the university academy works carried out between 2009 and 2021 in collaboration with the Barcelona Zoo, with a total of 13 PhD Theses, 38 Master's Theses and 112 Bachelor's Theses.

## Primate management in urban conditions living

Sara Álvarez Solas<sup>1</sup>, Renata Rodríguez<sup>1</sup>, Victoria Viter<sup>2</sup>, Francisco Valladares, Gloria Corradini<sup>3</sup>, Camila Tamia Torres<sup>1</sup>, Daniela Narvaez<sup>1</sup>, Karla Vera<sup>1</sup>, Alejandro Peña Bucheli<sup>4</sup> & Anna Maria Miralles Alvarez<sup>5</sup>

<sup>1</sup>Universidad Regional Amazónica Ikiam, Grupo de Biogeografía y Ecología Espacial, Grupo Roots&Shoots Ecuador. <sup>2</sup>Centro de Rescate AmaZOOnico. <sup>3</sup>Wageningen University, Netherlands. <sup>4</sup>Universitat de Girona. <sup>5</sup>Universidad Autónoma de Madrid.

[Sara.alvarez@ikiam.edu.ec](mailto:Sara.alvarez@ikiam.edu.ec)

**Keywords:** Capuchin monkey, coexistence, conflict, threats, plan

The urban expansion is forcing several species to live in close contact with humans. These situations are threatened animal lives and management plans are needed to provide animal and human welfare. In the parish of Misahualli (Ecuador), a group of eleven capuchin monkeys (*Cebus yuracus*) are living for more than 40 years in "semi-natural" conditions. Their flexibility and adaptability have made them able to coexist with human beings in this city, becoming an emblematic species. However, the great risks of the city threaten its survival. The main objective of our studies is to create a management plan for wild urban monkeys to improve the coexistence between humans and non-human primates. Nevertheless, this city represents an important scenario of education environmental program, illegal trafficking, sustainable ecotourism and animal welfare. In our management plan we elaborate several protocols for urban primate management through research results and involving local people. We found high levels of stress (measured through cortisol levels) compared to captive groups, a high percentage of aggressive interaction with humans, and poor health conditions in several individuals. We highlight the necessity of management plans and local participation in urban conditions as the only possibility of coexistence between humans and non-human primates.

### Species-specific management strategies while living in all-male groups: chimpanzees vs gorillas

Nerea Amezcua-Valmala<sup>1,2</sup>, Catarina Casanova<sup>3,4</sup> & Fernando Colmenares<sup>1</sup>

<sup>1</sup>Grupo UCM de Psicobiología social, evolutiva y comparada. Universidad Complutense de Madrid, Campus de Somosaguas, 28223, Madrid, Spain. <sup>2</sup>Facultad de Ciencias Biomédicas y de la Salud. Universidad Europea de Madrid, c/Tajo, s/n. 28670 Villaviciosa de Odón, Madrid, Spain. <sup>3</sup>Research Centre for Anthropology and Health, Department of Life Sciences, University of Coimbra, 2000-456 Coimbra, Portugal. <sup>4</sup>ISCSP/CAPP, Universidade de Lisboa, Portugal.

[nereaamezcua@gmail.com](mailto:nereaamezcua@gmail.com)

**Keywords:** *Pan troglodytes*, *Gorilla gorilla gorilla*, all-male groups, conflict management, coding system

Chimpanzees and gorillas are highly social species that are born and grown in communities, chimpanzees are male-bonded, and gorillas are cross-sex bonded. Males from both species are usually found in captivity in what is known as all-male groups, which is useful to avoid the isolation of individuals but may entail costs. This research investigates social interactions and conflict management strategies of males housed in all-male groups in both species. To collect data, group-focal sampling was conducted continuously during 15 minutes-long periods on 10 chimpanzees housed at La Vallée des Singes and on 6 gorillas housed at Loro Parque. To analyse conflict management and assess dominance relationships we developed a coding system focused on group-level social exchanges during conflicts. In accordance with each species' biology, we expected linear and steep dominance relationships among male chimpanzees, with subordinates recognizing their lower position through formal submissive signals. In contrast, gorillas should show undifferentiated dominance relationships, with highly bidirectional conflicts and lack of formal signals of submission. Our results show that each species displayed different strategies when living in all-male

groups, and the differences went in the predicted direction. Both species managed to successfully live with other males, although their behaviours remained substantially species-specific.

### **Chimpanzees in captivity: does the demographic structure affect the time allocated to different activities?**

Nerea Amezcua-Valmala<sup>1,2</sup>, Ester Orient Pérez<sup>3</sup>, Catarina Casanova<sup>4,5</sup>, Federico Guillén-Salazar<sup>3</sup> & Fernando Colmenares<sup>1</sup>

<sup>1</sup>Grupo UCM de Psicobiología social, evolutiva y comparada. Universidad Complutense de Madrid, Campus de Somosaguas, 28223, Madrid, Spain. <sup>2</sup>Facultad de Ciencias Biomédicas y de la Salud. Universidad Europea de Madrid, c/Tajo, s/n. 28670 Villaviciosa de Odón, Madrid, Spain. <sup>3</sup>Ethology and Animal Welfare Section, Universidad Cardenal Herrera-CEU, CEU Universities, Tirant lo Blanc 7, E-46115 Alfara del Patriarca, Valencia, Spain. <sup>4</sup>Research Centre for Anthropology and Health, Department of Life Sciences, University of Coimbra, 2000-456 Coimbra, Portugal. <sup>5</sup>ISCSP/CAPP, Universidade de Lisboa, Portugal.

[nereaamezcua@gmail.com](mailto:nereaamezcua@gmail.com)

**Keywords:** *Pan troglodytes*, demography, captivity, activity-budgets, relationships

Chimpanzees live in multi-male/multi-female communities, where females disperse, and males establish strong bonds with one another within their community. At different sites, chimpanzees have been reported to invest differently on the four fitness-relevant activities that account for their active daytime: resting, moving, feeding and socializing. In captivity, the EAZA Ex-situ program (EEP) recommends housing this species in multi-male/multi-female groups, however, it is common to find a wide range of sociodemographic settings. In this study we collected data on a set of social and non-social behaviours in groups of chimpanzees with different demographic structures: two all-male, a multi-male/multi-female and a one-male group. We analysed the percentage of time invested to the diverse activities across the study groups and compared to wild populations and between the study groups. We expected to find that those groups composed of several males would distribute their active time more similarly to what has been reported in the wild, with higher scores in socializing time. Our results supported that the one-male group's activity budgets differed the most from what has been reported in wild populations and, we found variability across the different study groups which is consistent with previous research. Chimpanzees' behaviour appeared to be flexible, with the presence of males probably being a key factor in expressing chimpanzee-like behaviours.

### **Morphological characterisation of the temporomandibular joint in chimpanzees and humans**

Yasmina Avia<sup>1,2</sup>, Aroa Casado<sup>2,3,4,5</sup>, Juan Francisco Pastor<sup>6</sup>, Félix de Paz<sup>6</sup>, Roberto Cabo<sup>6,7</sup>, Josep Maria Potau<sup>2,3</sup> & Elisabeth Cuesta-Torralvo<sup>1,2</sup>

<sup>1</sup>Biological Anthropology Unit - Physical Anthropology Area. Department of Animal Biology, Plant Biology and Ecology. Autonomous University of Barcelona. <sup>2</sup>Faculty of Geography and History, Institut d'Arqueologia de la Universitat de Barcelona, University of Barcelona. <sup>3</sup>Human Anatomy and Embryology Unit, University of Barcelona, Spain. <sup>4</sup>Department of Evolutionary Biology, Ecology and Environmental Sciences, University of Barcelona, Spain. <sup>5</sup>Gimbernat University Schools (EUG) – Physiotherapy Degree.

<sup>6</sup>Department of Anatomy and Radiology, University of Valladolid. <sup>7</sup>SINPOS Research Group, Department of Morphology and Cell Biology, University of Oviedo.

[yasmina.avia@uab.cat](mailto:yasmina.avia@uab.cat) / [aroa.casado@ub.edu](mailto:aroa.casado@ub.edu)

**Keywords:** mandible, TMJ, mastication, hominoid

Previous studies have shown that the feeding strategy of great apes has usually been correlated with the morphology of the temporomandibular joint (TMJ). The TMJ is essential for the chewing apparatus, as it transmits the forces between the jaw and the skull. Several functional models have speculated on the importance of the size of the articular surface of the TMJ joint surface in relation to the gliding contacts that occur during chewing activities. However, few studies have addressed the morphological complexity of the TMJ joint surface. Throughout this study, the 3D surfaces of the TMJ of 25 individuals from two genetically related species (12 chimpanzees and 13 humans) were analysed to explore if there are significant differences between both species. The results show that there are significant differences between the studied surfaces that may correlate with the masticatory pattern. However, by normalizing the size of the surfaces with the total size of the skull, the differences are no longer significant. For that reason, topographic studies that investigate the morphology of the TMJ's relief of both species are needed.

### Comparative cognition between chimpanzees and children aged 1 to 3 years on the combinatorial manipulation of objects

M<sup>a</sup> Nazaret Batista Ramírez<sup>1</sup>, David Rivera Rey<sup>2</sup> & Begoña Escribano Durán<sup>1</sup>

<sup>1</sup>Universidad de Córdoba. Facultad de Veterinaria. Departamento de Biología Celular, Fisiología e Inmunología. <sup>2</sup>Pictograma (gabinete de asistencia psicológica infantil).

[nazaretbatistaramirez@gmail.com](mailto:nazaretbatistaramirez@gmail.com)

**Keywords:** Cognition, combinatorial manipulation, infants, chimpanzee, cognitive development

This study focuses on the comparison between humans and chimpanzees, phylogenetically related species, in the combinatorial manipulation of objects, with the aim of offering an approximation to the common origin and the subsequent divergences of their cognitive abilities. Four non-verbal tasks were evaluated in 62 children from "La Pradera" Nursery School (San Fernando, Cádiz) aged between 1 and 3 years. In these tasks, insertion and accumulation behaviours are executed, complex actions that require a great cognitive development. In two tasks, children had to insert objects in the correct position and place, and in another two stack objects in a specific way and order. These tests were analysed in age ranges of three months, and the means and percentages of achievement of the tests were obtained. The results were compared with the results of other research studies with chimpanzees obtained through a bibliography review. The results have shown similarities in the ranges of development of motor skills in the early stages of both species. However, from the age of two, humans begin to outperform chimpanzees in their abilities due to the appearance of coordination and fine motor skills.

### Presence of "hair pulling" in non-human primates in captivity

Gema Benedicto Rodríguez <sup>1</sup>, Hugo Cano Fernández<sup>2</sup> & Josefina Zapata<sup>3</sup>

<sup>1</sup>Department of Information and Communications Technologies, Polytechnical University of Cartagena, 30202, Cartagena (Murcia). <sup>2</sup>Department de Genètica i de Microbiologia, Universidad Autónoma de

Barcelona, Cerdanyola del Vallès, Spain. <sup>3</sup>Department of Zoology and Physical Anthropology, University of Murcia. Espinardo 30100, Murcia.

[benedicto.gema@gmail.com](mailto:benedicto.gema@gmail.com)

**Keywords:** welfare, abnormal behaviour, stereotypy, captivity, hair pulling

Hair pulling is a stereotypical behaviour defined as plucking hair with the hands or teeth and considered a symptom of low animal welfare. The aim of this study was to investigate its occurrence in captive non-human primates through a meta-analysis. Using the key words “welfare”, “abnormal development”, “behaviour”, “disorder”, “stereotypy”, “agonist”, “captivity”, “hair pulling”, “self-directed”, “socio-directed”, 69 papers representing a wide range of primate groups (cercopithecoids, lemurs, and apes) were analysed. Percentages of occurrence by sex, age and species were calculated from the total number of individuals performing hair pulling adding all the studies (N=146). The most affected areas and methods to pluck hair were also recorded when specified by the authors. The results show that the most frequently studied species were *Macaca mulatta* and *Pan paniscus*, and hair pulling appeared in both sexes, but with different frequencies depending on age. Young males and adult females performed this behaviour more frequently and infants were the most likely to receive it. Using the hands was the most common method for plucking hair and the most affected areas were head and arms. Finally, a better understanding of the genetic, cognitive and environmental basis of hair pulling is vital for designing prevention programs.

## Vigilance behaviour, fission-fusion dynamics and subgroup composition in wild spider monkeys (*Ateles geoffroyi*)

Chiara Bernardi<sup>1</sup>, Sara Valdivieso<sup>1</sup>, Federica Amici<sup>2,3</sup>, Filippo Aureli<sup>4,5,6</sup> & Miquel Llorente<sup>1,7,8</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, Girona, Spain. <sup>2</sup>Department of Comparative Cultural Psychology, Max Planck Institute for Evolutionary Anthropology, 04103, Leipzig, Germany. <sup>3</sup>Faculty of Life Sciences, Institute of Biology, University of Leipzig, 04103, Leipzig, Germany. <sup>4</sup>Instituto de Neuroetologia, Universidad Veracruzana, 91190, Xalapa, Mexico. <sup>5</sup>ConMonoMaya A.C., 97770, Chemax, Mexico. <sup>6</sup>School of Biological and Environmental Sciences, Faculty of Science, Liverpool John Moores University, Liverpool, UK. <sup>7</sup>Serra Hünter Fellow, Grup de Recerca “Llenguatge i Cognició”, Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Girona, Spain. <sup>8</sup>Institut de Recerca i Estudis en Primatologia, IPRIM, 17246 Santa Cristina d'Aro, Spain.

[chiara.bernardi.15@gmail.com](mailto:chiara.bernardi.15@gmail.com)

**Keywords:** vigilance, fission-fusion dynamics, subgroup composition, quality relationship, spider monkeys

In spider monkeys, vigilance behaviour is mostly used to monitor intra-group threats, like changes in the subgroup and risky group members. In this study, we collected data on vigilance and social interactions in 49 spider monkeys (*Ateles geoffroyi*) living in the protected area of Otoch Ma'ax Yetel Kooch, Yucatan, Mexico. We tested whether vigilance was affected by fission-fusion dynamics and by the specific features of the individuals within the subgroup (i.e.: subgroup size, activity, sex ratio, immature presence, quality relationship and in mothers, presence of dependent offspring and lactation behaviour). We ran generalized linear mixed models using a Bayesian approach, and found that the proportion of time spent in vigilance increased when fusion events took place and with larger subgroup size was larger, being higher during resting and social interactions than when travelling or feeding. We also found that a higher number of adult males in the subgroup led to an increase in the proportion of time spent in vigilance by females, but not by males, and that a higher number of juveniles increased the proportion of time spent in vigilance. These



results are consistent with the view that fission-fusion dynamics and specific subgroup characteristics may affect vigilance behaviour.

## Two colobine monkeys in two West African forests – does the conservation of the ecosystem influence the primates' evolutionary potential?

Filipa Borges<sup>\*1,2,3,4</sup>, Tânia Minhós<sup>\*1,4,5</sup>, Bárbara Parreira<sup>\*4</sup>, Rúben Oliveira<sup>6,7</sup>, Isa Aleixo Pais<sup>1,8</sup>, Fabian Leendertz<sup>9,10</sup>, Roman Wittig<sup>11,12,13</sup>, Carlos Fernandes<sup>7,14</sup>, Guilherme Marques<sup>1,5,15</sup>, Miguel Duarte<sup>1,5,16</sup>, Michael Bruford<sup>8</sup>, Maria Joana Ferreira da Silva<sup>3,8,17</sup>, Lounès Chikhi<sup>4,18</sup>

\*shared first co-authorship

<sup>1</sup>Centre for Research in Anthropology (CRIA), Av. Forças Armadas, Edifício ISCTE, sala 2w2, 1649-026 Lisboa, Portugal. <sup>2</sup>Centre for Ecology and Conservation, University of Exeter, Penryn, Cornwall TR10 9FE, U.K. <sup>3</sup>CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Campus de Vairão, Universidade do Porto, 4485-661 Vairão, Portugal. <sup>4</sup>Instituto Gulbenkian de Ciência, Rua da Quinta Grande, 6, 2780-156 Oeiras, Portugal. <sup>5</sup>Anthropology Department, School of Social Sciences and Humanities, Universidade Nova de Lisboa (NOVA FCSH), Av. de Berna, 26-C, 1069-061 Lisboa, Portugal. <sup>6</sup>Senciência, Lda., Palácio Baldaya - CoWork Baldaya, Estrada de Benfica 701 - 1500-087 Lisboa, Portugal. <sup>7</sup>cE3c - Centre for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute, Departamento de Biologia Animal, Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisboa, Portugal. <sup>8</sup>Organisms and Environment Division, School of Biosciences, Cardiff University, Sir Martin Evans Building, Museum Avenue, Cardiff, Wales, UK CF10 3AX. <sup>9</sup>Epidemiology of Highly Pathogenic Microorganisms, Robert Koch Institute, Berlin, Germany. <sup>10</sup>Helmholtz Institute for One Health, Greifswald, Germany. <sup>11</sup>Department of Human Behaviour, Ecology and Culture, Max Planck Institute for Evolutionary Anthropology, Deutscher Platz 6, 04103 Leipzig, Germany. <sup>12</sup>The Ape Social Mind Lab, Institut des Sciences Cognitives, CNRS, 67 Boulevard Pinel, 69675 Bron, Lyon, France. <sup>13</sup>Tai Chimpanzee Project, Centre Suisse de Recherches Scientifiques, 01 BP 1303, Ivory Coast. <sup>14</sup>Faculdade de Psicologia, Universidade de Lisboa, Alameda da Universidade, 1649-013 Lisboa, Portugal. <sup>15</sup>University of Vienna, Department of Behavioural and Cognitive Biology, Faculty of Life Sciences, Althanstrasse 14 (UZA1), 1090 Vienna, Austria. <sup>16</sup>University of Texas at San Antonio (UTSA), Department of Anthropology, College of Liberal and Fine Arts, San Antonio TX 78249-1644. <sup>17</sup>BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Campus de Vairão, 4485-661 Vairão, Portugal. <sup>18</sup>Laboratoire Évolution & Diversité Biologique (EDB UMR 5174), Université de Toulouse Midi-Pyrénées, CNRS, IRD, UPS. 118 route de Narbonne, Bat 4R1, 31062 Toulouse cedex 9, France.

[filipa.fsb@gmail.com](mailto:filipa.fsb@gmail.com)

**Keywords:** Guinea-Bissau, Ivory Coast, arboreal primates, biodiversity conservation, conservation genetics

Tropical ecosystems harbour the highest levels of biodiversity on Earth. However, they are the most threatened with habitat destruction and degradation. African colobine monkeys are mainly folivorous and strictly arboreal, thus requiring large forests to subsist and being particularly vulnerable. This study investigated the western red colobus (*Piliocolobus badius*) and the king colobus (*Colobus polykomos*) in Cantanhez National Park (CNP), Guinea-Bissau, and Tai National Park (TNP), Ivory Coast. We used a panel of up to 14 microsatellites and a region of 478 base pairs of the mitochondrial DNA to examine their genetic diversity, population structure, and demographic history. We analysed up to 79 western red colobuses from CNP and 29 from TNP, as well as up to 72 king colobuses from CNP and 8 from TNP. Our

main goal was to compare the genetic status of these populations in two tropical forests that exhibit contrasting levels of habitat conservation – CNP is considerably more fragmented and degraded than TNP. Our results reveal the well-preserved forest of TNP harbours higher levels of genetic diversity than CNP, as well as historically larger and stabler populations. This suggests that the preservation of large forests is crucial for maintaining these primates' evolutionary potential.

### **Development of vocal sequences: structural complexity and combinatorial potential in wild chimpanzees (*Pan troglodytes verus*)**

Tatiana Bortolato<sup>1,2,3</sup>, Roger Mundry<sup>4,5,6</sup>, Roman M. Wittig<sup>1,2,3</sup>, Cédric Girard-Buttoz<sup>1,2,3</sup> & Catherine Crockford<sup>1,2,3</sup>

<sup>1</sup>Department of Human Behaviour, Ecology and Culture, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany. <sup>2</sup>The Ape Social Mind Lab, Institut des Sciences Cognitives, CNRS, Lyon, France. <sup>3</sup>Tai Chimpanzee Project, Centre Swiss des Recherches Scientifiques, Cote d'Ivoire. <sup>4</sup>Cognitive Ethology Laboratory, German Primate Center, Leibniz Institute for Primate Research, Kellnerweg 4, 37077 Göttingen. <sup>5</sup>Department for Primate Cognition, Georg-August-University Göttingen, Germany. <sup>6</sup>Leibniz Science Campus Primate Cognition, Göttingen, Germany.

[tatiana\\_bortolato@eva.mpg.de](mailto:tatiana_bortolato@eva.mpg.de)

**Keywords:** communication, vocal complexity, social complexity, language, ontogeny

Why has the unique combinatorial capacity in human language evolved? The social complexity theory suggests complex signalling systems are needed when living in complex social groups. Compared with most non-human primates, chimpanzees present a complex vocal system comprising hundreds of sequences. We used the diversification of the social world through ontogeny to test whether social complexity, or alternative factors, drive the development of chimpanzee vocal structural complexity. We recorded 10,929 vocal utterances from 98 wild chimpanzees aged 0 to 55 years, from Ivory Coast. We developed Generalized non-linear Models to test our hypotheses predicting the age at emergence, steepest increase and asymptote during the non-linear development of utterance length and diversity. We found that chimpanzees need ten years to reach adult levels of vocal production. Steepest increases coincided with weaning age (4 years) and plateaued in sub-adults (8-10 years). Our results support the “social complexity hypothesis” since increased social exposure at key developmental milestones matches the developmental trajectory of vocal complexity. As humans live in a complex social world, empirical support for this theory may be relevant to explain human language evolution.

### **PrimLab: A new model to understand primate spatial behaviour**

Hugo Cano-Fernández<sup>1</sup> & Josefina Zapata<sup>2</sup>

<sup>1</sup>Department de Genètica i de Microbiologia, Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Spain. <sup>2</sup>Department of Zoology and Physical Anthropology, University of Murcia. Espinardo 30100, Murcia.

[hugo.cano@uab.cat](mailto:hugo.cano@uab.cat)

**Keywords:** Spatial behaviour, social networks, model, *Lemur catta*, *Varecia variegata*

The spatial behaviour of primates results of a complex interplay between individuals and their environment. This study aims to test whether this process can be predicted using experimental data and a computational

model. Experimental data of spatial behaviour were recorded from two groups of lemurs (*Lemur catta*  $N=4$ ; *Varecia variegata*  $N=3$ ) sharing the same enclosure. The enclosure was divided in five zones and the position of each individual in every moment was registered during 8h. A spatial network was built using individuals as nodes and the time spent in the same zone as edges. Results show that same-species individuals spend more time together than with individuals from a different species, except for the two dominant females. The computational model PrimLab was used to predict these results because it simulates the spatial behaviour of any primate group, considering social interactions, environmental heterogeneity and physical constraints. Five thousand simulations were performed assuming experimentally observed spatial preferences and a social network where only same-species individuals attracted each other. The attraction strength values were randomly determined in each simulation to account for heterogeneity in social interactions. The model replicated the observed network, meaning that the spatial behaviour may be predictable.

### Implementing a photogrammetric technique for measuring body size of wild chimpanzees from camera trap video footage

Sara Cardoso<sup>1</sup>, R. Adriana Hernandez-Aguilar<sup>2,3</sup>, Laia Dotras<sup>2,3</sup>, Nadia Mirghani<sup>3</sup>, Manuel Llana<sup>3</sup>, Amanda Barciela<sup>3</sup> & Jordi Galbany<sup>3,4,5</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, 17003 Girona, Spain, <sup>2</sup>Department of Social Psychology and Quantitative Psychology, Faculty of Psychology, University of Barcelona, Barcelona, Spain. <sup>3</sup>Jane Goodall Institute Spain and Senegal. Dindéfelo Biological Station, Dindéfelo, Kedougou, Senegal. <sup>4</sup>Department of Clinical Psychology and Psychobiology, Faculty of Psychology, University of Barcelona, Barcelona, Spain. <sup>5</sup>Institute of Neurosciences, University of Barcelona. Barcelona, Spain.

[scardosorod@gmail.com](mailto:scardosorod@gmail.com)

**Keywords:** Photogrammetry, non-invasive, *Pan troglodytes verus*, morphological traits, Dindéfelo

Assessment of chimpanzee physical traits in their natural habitats is rare even though studies of physical development contribute to a better understanding of their life-history. Recent studies have concluded that photogrammetry is a useful, non-invasive technique for obtaining measures of animal body parts. In this study, we validated a photogrammetric technique using camera trap video footage for measuring morphological traits in a wild population of chimpanzees living in Dindéfelo, Senegal. Using a natural, non-variable structure located within the camera trap frame as a scale, we were able to take back width (shoulder to shoulder,  $N=14$ ) and body length (shoulder to rump,  $N=53$ ) measurements in a standard position. Mean values of both measurements by age-class categories (infant, juvenile, subadult and adult) showed very low coefficient of variation, ranging from 0.0068 to 0.1830 (mean value=0.0666). We obtained reliable body size measurements for this population and detected significant differences between age classes. We also found that adult chimpanzees showed higher percentage of sexual dimorphism for back width (19%) than for body length (6%). We concluded that this technique may have great potential to measure body size in wild chimpanzees. Future research should consider individual identification of chimpanzees to allow for more precise results.

### Ethical considerations on the use of new technologies in primatology

Catarina Casanova<sup>1,2</sup>

<sup>1</sup>*Centro de Investigação em Antropologia e Saúde, Departamento de Ciências da Vida, Universidade de Coimbra, Coimbra, Portugal.* <sup>2</sup>*Universidade de Lisboa, Instituto Superior de Ciências Sociais e Políticas, Lisboa, Portugal.*

[ccasanova@iscsp.ulisboa.pt](mailto:ccasanova@iscsp.ulisboa.pt)

**Keywords:** Privacy, illegal activities, informed consent, images, conservation

Data collection - whether in natural habitats or captive or semi-captive colonies – always implied frequent ethical concerns: not only with nonhuman primates but also with humans, governments, NGO's, traditional power structures and local dynamics, etc. There is a considerable body of literature regarding ethical dilemmas in primatology but when considering “new” equipment such as camera traps, we still need more experience. Cameras are used for all types of research due to many reasons. They became more widely available in the last 15 years. The time has come to think about the effects of this technology: ranging from witnessing illegal behaviour (hunting and bushmeat) to the images of people who end up appearing in the scene (even if they don't know it and are just a “by-product”), primatologists still have to reflect upon this problem. Which type of records are admissible to keep? For how long and who may have access? There is an urgent need for a code of conduct to deal with the images obtain via this technique, since it is clear that it is not enough to inform local populations of their existence and location. This presentation seeks to discuss the main challenges that arouse with the use of this technology.

## What do we currently know about mona monkeys (*Cercopithecus mona*) in São Tomé and Príncipe Islands?

C. Casanova<sup>1,2</sup> & G. Jesus<sup>1,3</sup>

<sup>1</sup>*Centro de Investigação em Antropologia e Saúde, Departamento de Ciências da Vida, Universidade de Coimbra, Coimbra, Portugal.* <sup>2</sup>*Universidade de Lisboa, Instituto Superior de Ciências Sociais e Políticas, Lisboa, Portugal.* <sup>3</sup>*Universidade Lusófona de Humanidades e Tecnologia, Escola de Psicologia e Ciências da Vida, Lisboa, Portugal.*

[ccasanova@iscsp.ulisboa.pt](mailto:ccasanova@iscsp.ulisboa.pt)

**Keywords:** Threats, mona monkeys, recces, perception of stakeholders

Anthropogenic land-use change is a major driver of the current extinction crisis, but the processes through which it acts on biodiversity are complex and still poorly understood. The main threats to biodiversity in São Tomé and Príncipe Islands (STP) appear to be forest-clearing for oil palm, horticultural and cacao plantations. This presentation focusses on a primate species deliberately introduced in the 17<sup>th</sup> century in STP, *Cercopithecus mona*. Together with wild dogs, cats, rats, mice and livestock, ST (and later Príncipe) started harbouring populations of mona monkeys, along with African civets (*Civettictis civetta*), European weasels (*Mustela nivalis*) and feral pigs (*Sus domesticus*). Some authors argue that monas are common throughout the island's forested habitats. However, recent works on biodiversity in the area mentioned that, according to the hunter perceptions, the numbers of these primates are declining. We present data collected in 2022 using methods such as ethnographic techniques (interviews and observation) which allowed us to better understand the importance and frequency of mona meat consumption and how primates are seen by farmers, tourists and other stakeholders. We also conducted exploratory recces in both STP islands to assess the distribution of monas and plan future census under a collaborative framework.

## Eight years of guenon conservation genetics in Guinea-Bissau, West Africa: outcomes and future perspectives

Ivo Colmonero-Costeira<sup>1,2,3,4</sup>, Isa Aleixo Pais<sup>1,5</sup>, Filipa Borges<sup>2,3,5,6,7</sup>, Susana Costa<sup>4</sup>, Tânia Minhós<sup>5,7,8</sup>, Mike William Bruford<sup>1,9</sup> & Maria Joana Ferreira da Silva<sup>1,2,3</sup>

<sup>1</sup>OnE, Organisms and Environment Division, School of Biosciences, Cardiff University, Cardiff, UK. <sup>2</sup>CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Campus de Vairão, Universidade do Porto, Vairão, Portugal. <sup>3</sup>BIOPOLIS, Program in Genomics, Biodiversity and Land Planning, Vairão, Portugal. <sup>4</sup>CIAS, Research Centre for Anthropology and Health, Universidade de Coimbra, Coimbra, Portugal. <sup>5</sup>CRIA, Centre for Research in Anthropology (CRIA-FCSH/NOVA), Lisbon, Portugal. <sup>6</sup>CEC, Centre for Ecology and Conservation, University of Exeter, Exeter, UK. <sup>7</sup>Instituto Gulbenkian de Ciência, Oeiras, Portugal. <sup>8</sup>Department of Anthropology, School of Social Sciences and Humanities, Universidade Nova de Lisboa, Lisbon, Portugal. <sup>9</sup>Sustainable Places Research Institute, Cardiff University, Cardiff, UK.

[colmonerocosteirai@cardiff.ac.uk](mailto:colmonerocosteirai@cardiff.ac.uk)

[costeira.ivo@gmail.com](mailto:costeira.ivo@gmail.com)

**Keywords:** Old world monkeys, genetic diversity, non-invasive genetics, primate conservation

Guinea-Bissau (GB), West Africa, harbours three virtually unstudied guenons (tribe Cercopithecini): the lesser spot-nosed monkey (*Cercopithecus petaurista*), Campbell's monkey (*Cercopithecus campbelli*) and the green monkey (*Chlorocebus sabaeus*). Human-non-human primate conflicts and seemingly widespread bushmeat hunting could compromise these populations in GB, particularly in the Bijagós Archipelago where carrying capacities are naturally limited. Here, we aimed to update the species distribution across the country, estimate genetic diversity and population structure. We compiled presence and non-invasive genetic data collected during the last eight years, which includes 270 samples from Southern GB and the Bijagós Archipelago. Results suggest the species' distribution may include areas not considered before. We found high genetic diversity for the three species and two highly divergent mitochondrial lineages of Campbell's and green monkeys, which diverged around 1.59-1.21 MYA. Insular populations of the lesser spot-nosed monkey display high genetic diversity and are structured per island; results suggest very low or inexistent geneflow. Taken together, our results suggest that there is high conservation value for these taxa in the country, however, we highlight that further baseline research is needed to fully assess their local conservation status. Future work to investigate their socio-cultural importance for local communities is underway.

## Mother-Infant Interactions in Western Lowland Gorillas (*Gorilla gorilla gorilla*) at the Barcelona Zoo: influence of physical contact and maternal transport style

Fabiana P. Corcione<sup>1</sup>, Jordi Galbany<sup>1,2</sup> & Carles-Enric Riba Campos<sup>3,4,5</sup>

<sup>1</sup>Dept. of Clinical Psychology and Psychobiology, Faculty of Psychology, University of Barcelona, 08035 Barcelona, Spain. <sup>2</sup>Institute of Neurosciences, University of Barcelona. 08035 Barcelona, Spain. <sup>3</sup>Professor Honorífic, Universitat de Barcelona. Barcelona, Spain. <sup>4</sup>Estudis de Psicologia, Universitat Oberta de Catalunya. Barcelona, Spain. <sup>5</sup>Institut d'Estudis Catalans, Secció de Filosofia i Ciències Socials. Barcelona, Spain.

[fabicorcione@gmail.com](mailto:fabicorcione@gmail.com)

**Keywords:** Gorilla, mother-infant relationship, captive lowland gorillas, gorilla infant behaviour, mother transport gorilla

A close mother–infant relationship is the first and primary social experience in the young primate's life and, therefore, contributes significantly to the infant development in different ways. The main objective of this study is to expand our knowledge of mother-infant interaction in captive lowland gorillas (*Gorilla gorilla gorilla*) from Barcelona Zoo, Spain (n=4 dyads, infants aged 8 to 14 months), which is currently based on very few studies. We hypothesized that both the frequency of spatial proximity and types of maternal transport change with infant's age (considered in weeks) and previous mother's experience. Data were collected using the continuous focal sampling method along 30-min periods. Our results support the hypothesis, as the prevalence of time in close ventro-ventral contact decreased with age ( $R^2=0.152$ ;  $p<0.001$ ) and parity ( $R^2=0.093$ ;  $p<0.001$ ), considered as a factor (infants from multiparous females had lower values at the same age). Also, the infants increase distance from their mothers with age ( $R^2=0.545$ ;  $p<0.001$ ). In addition, there was a significant negative linear regression between infant's age and the percentage of time spent on transport by the mother ( $R^2=0.540$ ;  $p<0.001$ ). We conclude that both infant's age and mother's parity determine the behavioural development of gorillas during infancy.

### **Play- and real-fight in adult chimpanzees (*Pan troglodytes*): how do they structurally differ?**

Giada Cordoni<sup>1</sup>, Giulia Ciarcelluti<sup>1,2</sup>, Altea Pasqualotto<sup>1</sup>, Annarita Perri<sup>1</sup>, Veronica Bissiato<sup>1</sup> & Ivan Norscia<sup>1</sup>

<sup>1</sup>Department of Life Sciences and System Biology, University of Turin, Italy. <sup>2</sup>Mona Chimpanzee Sanctuary - Fundaciòn MONA, Riudellots de la Selva, Spain.

[giada.cordoni@unito.it](mailto:giada.cordoni@unito.it)

**Keywords:** repetition, session length, symmetry, role-reversal, *Pan troglodytes*

Play-Fight (PF) borrows patterns from other behavioural systems, in particular Real-Fight (RF). We collected videos (962 hours) on 30 adult chimpanzees housed at *Mona Chimpanzee Sanctuary* (Spain), *La Vallée des Singes* and *ZooParc de Beauval* (France). By applying structural/ecological indices, we tested for possible differences between PF and RF. We found that PF sessions were longer than RF ones. In PF – but not in RF - motor patterns were more frequently repeated (Repetition-Index) and more symmetrically exchanged between players (Asymmetry-Index). No difference was found in pattern variability (Shannon-Index) and evenness (Pielou-Index). The number of subjects involved in a single session (Polyadic-Index) was greater in RF than in PF. Via Normalized David's scores, we determined the rank position of each chimpanzee during both RF and PF and we found that individuals maintained the same dominant positions in both contexts. In conclusion, not all play key-features suggested in the literature were present in PF of our chimpanzees. Our findings showed that duration, repetition and symmetry can be considered key-structural-features of PF whereas variability, evenness, number of subjects and role-reversal were not. In this view, we can hypothesise that PF can maintain elements of RF when adult individuals are involved.

### **Abnormal and anxiety related behaviours in zoo chimpanzees: quantitative, qualitative and topographical analysis**

Eva Corral<sup>1</sup>, Helena Garcia-Saura<sup>1</sup>, Melissa Guinot<sup>1</sup>, Sandra Castells<sup>1</sup>, Josep Maria Alonso<sup>3</sup>, Maria Teresa Abelló<sup>4</sup> & Miquel Llorente<sup>1,2</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, Girona, Spain. <sup>2</sup>Serra Húnter Fellow, Grup de Recerca “Llenguatge i Cognició”, Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Girona, Spain. <sup>3</sup>Research and Conservation Department, Barcelona Zoo, Spain. <sup>4</sup>Primate Section, Barcelona Zoo, Spain.

[corralserranoeva@gmail.com](mailto:corralserranoeva@gmail.com)

**Keywords:** Abnormal psychology, behaviour analysis, anxiety, chimpanzees, welfare

Abnormal behaviour has been largely described in captive populations of non-human primates. Nevertheless, predominantly studies adopted a quantitative and group-level approach, while behavioural analysis (BA) can provide a quantitative, qualitative and individualized assessment in animal welfare studies. BA provides a more descriptive and inductive approach to the understanding of behavioural problems in non-human animals from a bottom-up point of view. We aimed to perform an analysis of the frequency, rate, duration, prevalence, diversity, and topography of abnormal and anxiety-related behaviours in a group of 7 chimpanzees housed at the Barcelona Zoo. We conducted 58 hours of observation, recording all occurrences and durations of the behaviours studied. We described the individual behavioural profile and identified the subjects with a more abnormal and anxious profile. Rate of abnormal and anxiety-related behaviours are intensively correlated. We also found an association between rate and duration of both abnormal and anxiety-related behaviours with the prevalence and diversity. Finally, abnormal and anxious profile were not related to the centrality and social influence of the subject in the group. This type of studies allowed us to understand the behavioural expression of stress and the individual variation promoting the design of more effective welfare interventions.

### Grooming and proximity network across different groups of captive *Sapajus apella*

Sergio Díaz González, Susana María Sánchez Rodríguez, Pablo Caso Parajon, Andra Paula Sticea Covaciu, Manuel José Esparza Baños, María Alicia Luján Rodríguez, Paula González Bermejo & Ana Fidalgo de las Heras

*Universidad Autónoma de Madrid.*

[sergio.diaz@uam.es](mailto:sergio.diaz@uam.es)

**Keywords:** Social network analyses, grooming, proximity, group structure, *Sapajus apella*

Primate sociality and group structure has often been studied using affiliative behaviours and spatial proximity, sometimes in combination and sometimes separately. Using Social Network Analysis, some studies have found a link between grooming networks and proximity network, although results are limited to each specific sample due to the idiosyncrasies of primate groups. The objectives of this study were to investigate grooming and proximity using SNA in several groups of captive brown capuchins (*Sapajus apella*) and we hypothesized that the networks resulting from both behaviours will be closely related. We collected data in three groups: a family group in a zoo (n=8), a family group in a primate sanctuary (n=7), and a group of non-related individuals in a primate sanctuary (n=5). The results show that the grooming network is related to the proximity network in all groups ( $r=0.51$ ,  $p<0.001$ ;  $r=0.59$ ,  $p=0.009$ ;  $r=0.74$ ,  $p=0.016$ ), indicating that those individuals that groom often also tend to spend more time in close proximity. These data suggest that the two networks share important similarities in captive capuchins regardless of group composition and setting, although further research is still needed to evaluate other aspects of the network such as aggression and play.

## Long-term resident male influence on dominance patterns on macaque societies

Ruth Dolado<sup>1,2,4</sup>, H el ene Meunier<sup>2,3</sup>, S ebastien Ballesta<sup>2,3</sup>, Marc Joosten<sup>2</sup>, Laura M armol<sup>2,4</sup>, Mireia Oliv e<sup>4</sup> & Francesc S. Beltran<sup>1,4</sup>

<sup>1</sup>*Institute of Neurosciences (neuroUB), University of Barcelona, Barcelona, Spain.* <sup>2</sup>*Centre de Primatologie, Universit  de Strasbourg, Niederhausbergen, France.* <sup>3</sup>*Laboratoire de Neurosciences Cognitives et Adaptatives, CNRS and Universit  de Strasbourg, Strasbourg, France.* <sup>4</sup>*Department of Social Psychology and Quantitative Psychology, University of Barcelona, Spain.*

[ruth.dolado@ub.edu](mailto:ruth.dolado@ub.edu)

**Keywords:** Male influence, aggression patterns, *Macaca* sp., semi-free conditions, social styles

Social structure in macaque societies focuses mostly on female-female interactions to obtain aggression patterns. Due to the presence of philopatric females on these species, non-sexual interactions between females and long-term resident males are not usually taking into account in the analysis of aggression patterns. In accordance with the social styles model on macaque proposed by Thierry (2000), we hypothesize that taking into account non-sexual male-female interactions will increase the aggression patterns (i.e. hierarchical gradient, mean dominance value, difference between maximum and minimum dominance values, unidirectionality of aggression, correlation between rank and aggression given and received) leading the group to a more despotic social style. We develop a simulation study to define the expected aggression patterns, males included, in four agent groups representing the four macaque social styles. We then compared the obtained simulation results with the aggression patterns of four groups of macaques (11 *Macaca mulatta*, 9 *Macaca fascicularis*, 23 *Macaca sylvanus* and 29 *Macaca tonkeana*) in semi-free ranging conditions. Conversely to our hypothesis, results showed that groups with a high proportion of males showed smoothed aggression measures leading the group to more egalitarian aggression patterns. Moreover, changes on female dominance ranks suggest that long-term resident males modify the macaque social structure in semi-free ranging groups. Therefore, our results suggest that male-female interactions should be taken into account to define the aggression patterns.

## Effects of long-term resident males among macaques: An agent-based model

Ruth Dolado<sup>1,2</sup>, Elisabet Gimeno<sup>2</sup> & Francesc S. Beltran<sup>1,2</sup>

<sup>1</sup>*Institute of Neurosciences (neuroUB), University of Barcelona, Barcelona, Spain.* <sup>2</sup>*Department of Social Psychology and Quantitative Psychology, University of Barcelona, Spain.*

[ruth.dolado@ub.edu](mailto:ruth.dolado@ub.edu)

**Keywords:** *Macaca* societies, social structures, resident males, simulation, agent-based models

The research of social structure (i.e. aggression patterns) in macaque societies mainly focuses on female-female interactions and the long-resident males are not taking into account. Dolado et al. (2021) suggested that the social styles are an emergent social behaviour which can be modelled by agent-based models. We therefore performed a simulation study using both, male and female relationships, to define theoretical aggression patterns based on covariation hypothesis (i.e hierarchical gradient, mean dominance value, difference between maximum and minimum dominance values, unidirectionality of aggression, correlation between rank and aggression given and received). We used the A-KinGDom agent based-model, which contains a two-dimensional microworld where the agents can detect their opponents' dominance, anxiety and kin relatedness. At each time, agents take decisions about whether or not to interact by balancing their own and others' features such as the values for dominance, anxiety level and kin relatedness, which lead



to different behaviours depending on the opponent characteristics and modify the distribution of dominance and affiliative interactions, which, in turn, allows emerge the four dominance styles. We ran 50 independent simulations for each simulation condition until 200 simulations had been completed. According to the social styles model, results show that the presence of long-term resident males in groups involves an increase of the values of six aggression parameters in simulations leading the groups towards a despotic social style.

### First evidence of the Endangered King colobus (*Colobus polykomos*) in Senegal

Laia Dotras<sup>1,2</sup>, Amanda Barciela<sup>1</sup>, Manuel Llana<sup>1</sup>, Nadia Mirghani<sup>1</sup>, Carlota F. Galán-Plana<sup>1</sup>, Jordi Galbany<sup>1,3,4</sup>, R. Adriana Hernandez-Aguilar<sup>1,2,5</sup>

<sup>1</sup>Jane Goodall Institute Spain and Senegal. Dindéfelo Biological Station, Dindéfelo, Kedougou, Senegal. <sup>2</sup>Department of Social Psychology and Quantitative Psychology, Faculty of Psychology, University of Barcelona. Barcelona, Spain. <sup>3</sup>Department of Clinical Psychology and Psychobiology. Faculty of Psychology, University of Barcelona. Barcelona, Spain. <sup>4</sup>Institute of Neurosciences, University of Barcelona. Barcelona, Spain. <sup>5</sup>Serra Hunter Programme, Generalitat de Catalunya, Spain.

[laia.dotras@janegoodall.es](mailto:laia.dotras@janegoodall.es)

**Keywords:** Conservation, Colobinae, Dindéfelo, savanna habitat, ecological flexibility

The Endangered King colobus (*Colobus polykomos*) is an arboreal primate that inhabits rainforests, but it can also live in patches of forest vegetation of drier habitats including savanna woodlands. It is estimated that half of its total population has been lost over the last three decades. The main threats across its range are habitat loss and degradation, human population growth and hunting. The King colobus is found in West Africa, from Guinea Bissau to the east of the Sassandra River in Ivory Coast. Its presence has been deemed uncertain in Senegal and recently it has been considered possibly extinct in the country. Here, we describe seven opportunistic direct sightings and one video recording of King colobus in the Dindéfelo Community Nature Reserve, in southeastern Senegal, obtained from June 2018 to May 2022. The video was obtained from one of the camera traps deployed to record chimpanzee (*Pan troglodytes verus*) behaviour. This evidence expands the known distribution of *C. polykomos* further northeast and confirms for the first time the occurrence of this endangered species in Senegal. Our findings support the ecological flexibility of King colobus and the need to better understand its distribution and behaviour for its successful conservation.

### Hierarchy model based on affiliative behaviours of the group of tufted capuchin monkeys (*Sapajus apella*) of the Madrid Zoo Aquarium

Manuel José Esparza Baños, Andra Paula Sticea Covaciu, Sergio Díaz González & Ana Fidalgo de las Heras

Facultad Psicología, UAM.

[manspbanos@gmail.com](mailto:manspbanos@gmail.com)

**Keywords:** Grooming, hierarchy, *Sapajus apella*, network analysis, capuchin monkeys

Grooming as a tool in social relationships has been extensively studied in capuchin monkeys, but its distribution, along with its relationship to dominance, is a matter of debate. The present study discusses the different models of grooming direction in relation to hierarchy, in order to characterize the dominance relationships in the group of 8 individuals of capuchin monkeys (*Sapajus apella*) of the Madrid Zoo-

Aquarium. For this purpose, the distribution of this behaviour was studied through the analysis of social networks. The results are statistically significant for In-Strength centrality ( $R=-0.726$ ;  $p=0.037$ ) and for In-Eigenvector ( $R=-0.911$ ;  $p=0.006$ ), conforming to the "Up to Hierarchy" model, in which the direction of grooming is towards the most dominant individuals. In conclusion, we could say that our group's grooming distribution is related to the hierarchy. We have been able to create a theoretical model based on centrality measures, but it needs to be proved as a predictor, being very useful for studying the dominance relations using grooming distribution in other capuchins groups. These studies provide knowledge about group dynamics that could prove to be useful for the management of groups and for the maintenance of their welfare in captivity.

### **Evaluation of rehabilitation and social integration of a former pet and entertainment chimpanzee: Case study of an elderly female chimpanzee**

Jennifer Fernández García<sup>1,2</sup>, Pablo R. Ayuso<sup>1</sup>, Sònia Sánchez-López<sup>2</sup> & Dietmar Crailsheim<sup>1</sup>

<sup>1</sup>Research Department, Fundació MONA, Riudellots de la Selva, Spain. <sup>2</sup>Faculty of Psychology and Educational Sciences, Universitat Oberta de Catalunya, Barcelona, Spain.

[jennifer.fg.95@gmail.com](mailto:jennifer.fg.95@gmail.com)

**Keywords:** chimpanzee, rehabilitation, social, abnormal, age, senior

Over the last three decades the need for housing and rehabilitation opportunities for confiscated chimpanzees has grown. Especially older chimpanzees, who have spent more time in species inadequate conditions, tend to have more difficulties adapting to new environments and acquiring the necessary social skills, compared to younger chimpanzees. The aim of this case study is to evaluate the social integration and rehabilitation progress of a 48-year-old female chimpanzee with a background of prolonged social isolation and inadequate care and living conditions. During 10 months of gradually being exposed to other chimpanzees, her behaviour has been recorded using 2-min instantaneous interval sampling to describe the activity budget and continuous sampling to capture her activity. Based on descriptive analysis our data suggests that her social capacity and receptivity as well as activity budget was advancing desirably, i.e. decreasing inactivity and abnormal behaviour while increasing interactions with the environment and conspecifics. The establishment of first social bonds and eventually permanent social housing showed to be especially important for these behavioural changes to occur. These findings highlight the importance of social integration in the chimpanzees' rehabilitation, as well as demonstrate that even elderly chimpanzees have the potential to rehabilitate, achieving a life worthwhile living.

### **Describing the consumption of primate-meat with alcoholic drinks in Guinea-Bissau using social data and meta-barcoding techniques**

Maria Joana Ferreira da Silva<sup>1,2,3</sup>, Mariato Camará<sup>4</sup>, Bastian Egeter<sup>1</sup>, Tania Minhós<sup>5,6,7</sup>, Michael W Bruford<sup>3,8</sup> & Raquel Godinho<sup>1,2,9,10</sup>

<sup>1</sup>CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Universidade do Porto, Portugal. <sup>2</sup>BIOPOLIS Program in Genomics, Biodiversity and Land Planning, Portugal. <sup>3</sup>Organisms and Environment Division, School of Biosciences, Cardiff University, Cardiff, Wales, UK. <sup>4</sup>IBAP, Institute for Biodiversity and Protected Areas, Av. Dom Settimio Arturro Ferrazzetta, C.P - 70 - Bissau, República da Guiné Bissau. <sup>5</sup>Department of Anthropology, Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa, Avenida de Berna, 26-C, 1069-061 Lisbon, Portugal. <sup>6</sup>Centre for

*Research in Anthropology (CRIA), Instituto Universitário de Lisboa, Av. Forças Armadas Ed. ISCTE, 1649-026 Lisboa, Portugal.* <sup>7</sup>*Sustainable Places Research Institute, Cardiff University, 33 Park Place, Cardiff, CF10 3BA, Wales, UK.* <sup>8</sup>*Departamento de Biologia, Faculdade de Ciências da Universidade do Porto, Rua do Campo Alegre FC4, 4169-007 Porto, Portugal.* <sup>9</sup>*Department of Zoology, Faculty of Sciences, University of Johannesburg, 23, Auckland Park 2006, South Africa.*

[mjf\\_silva@cibio.up.pt](mailto:mjf_silva@cibio.up.pt)

**Keywords:** Cashew wine, cytb and 12S mitochondrial DNA regions, miseq

In Guinea-Bissau, non-human primate meat is consumed as a snack while drinking alcoholic beverages at small urban bars. Although wildlife conservation may be impacted, this trade is usually concealed and is not well characterized. We investigated the trade and consumption of primate meat at bars/restaurants in a small town located on the outskirts of a National Park. A member of the community assisting research visited six establishments every week for 15 months (2015-2017) to collect information on type and prices of meals and tissue samples, which were identified using metabarcoding tools. Qualitative information on the trade was obtained through semi-structured interviews with bar owners. Results show that meat was sold by the piece to consumers of alcoholic drinks at monetarily accessible prices for locals. Two hundred forty-nine tissue samples were successfully identified. Most samples were non-human primates (*Cercopithecus campbelli*, *Chlorocebus sabaeus* and *Papio papio*). Bar's owners were women who used the income to support their family. Bars were functioning at their house's or in small sheds. Culinary recipes, quantity of meat per dish and its price were invariable across establishments. This work's results suggest that *Abafatório* practices may have significant negative consequences to primate conservation in the country.

### **Lessons learned during the News for Nature/PRIMACTION project: increasing the visibility of current Guinea-Bissau non-human primates' conservation in the media**

M.J. Ferreira da Silva<sup>1,2,3</sup>, T. Minhós<sup>4,5</sup> & S. Sampaio-Dias<sup>6</sup>

<sup>1</sup>*CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Universidade do Porto, Portugal.* <sup>2</sup>*BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Portugal.* <sup>3</sup>*ONE - Organisms and Environment Division, School of Biosciences, Cardiff University, United Kingdom.* <sup>4</sup>*Centre for Research in Anthropology (CRIA – NOVA/FCSH), Portugal.* <sup>5</sup>*Department of Anthropology, School of Social Sciences and Humanities, Universidade Nova de Lisboa, Portugal.* <sup>6</sup>*School of Film, Media and Communication, University of Portsmouth, United Kingdom.*

[mjf\\_silva@cibio.up.pt](mailto:mjf_silva@cibio.up.pt)

**Keywords:** *Pan troglodytes verus*, ecosystem services, environmental journalism, radio-theatre

The *News for nature/ PRIMACTION* (2019-2022) project aimed to increase the visibility of Guinea-Bissau environmental-related themes in the media to improve the knowledge on the importance of primate species for ecosystems services and on the most prominent conservation threats. News for Nature collaborated with media agents (e.g., training journalists and media students and renowned Guinea-Bissau musicians and conservationists) to produce materials broadcasted in the media and online platforms. Activities were multi-disciplinary and implemented during challenging contexts. Collaborators were interviewed on perceived impacts and challenges. The most important outputs were i) a bi-monthly newspaper section dedicated to the “conservation of biodiversity in Guinea-Bissau”, which included special editions dedicated to protected areas, ii) three radio-theatre episodes, iii) one song written and interpreted by famous

musicians and precluded by Jane Goodall and v) a website providing technical tools for journalists covering biodiversity conservation-related news. Lack of logistical conditions to travel in the country was mentioned as a major impediment to report conservation-related news. Where scientific dissemination channels are not developed, the establishment of direct communication between media agents and non-national researchers/conservationists is key to improve the public's awareness on primate's conservation threats.

## Eco-evolutionary aspects of plant-lemur interactions

Lisieux Fuzessy<sup>1</sup>, Daniel Sol<sup>1</sup> & Miguel Verdú<sup>2</sup>

<sup>1</sup>CREAF, Centre de Recerca Ecològica i Aplicacions Forestals, Universitat Autònoma de Barcelona, Catalunya, Spain. <sup>2</sup>Centro de Investigaciones sobre Desertificación, CSIC-UV-GV, Moncada, Valencia, Spain.

[l.fuzessy@creaf.uab.cat](mailto:l.fuzessy@creaf.uab.cat); [lfuzessy@gmail.com](mailto:lfuzessy@gmail.com)

**Keywords:** Coevolution, co-phylogenetic signal, phylogenetic congruence, Strepsirrhini, mutualism, antagonism

Plant-animal interactions potentially drive the evolution of interacting clades, with consequences to diversification. Evidence for macro-coevolutionary patterns in multi-specific plant-animal interactions is scarce, and the mechanisms driving them remain unexplored. Here we tested for phylogenetic congruence in plant-lemur interactions using a Procrustean Approach to Cophylogeny (PACo). PACo addresses cophylogeny by optimizing the fit of phylogeny-interaction graphs of a given interaction matrix. Results showed significant signals, suggesting that both clades share evolutionary history. Despite the property of the interaction (antagonistic and/or mutualistic), co-phylogenetic patterns emerged. We also found that similar lemurs (in terms of the between-species dissimilarity in sets of interacting species) interact with phylogenetically-related plant species, while similar plants (in terms of the between-species dissimilarity in sets of interacting species) interact with phylogenetically-related lemurs only in the case of frugivory and folivory. Our results suggest that congruence in the phylogenies of plants and lemurs does not arise from co-speciation processes. Instead, plant speciation may occur independently, and lemurs seem to be tracking the diversification of plants. The emerging patterns were modulated by attributes related to fruit consumption. So, trait convergence among multiple partners within multi-specific assemblages appears as a mechanism favouring observed co-phylogenetic outcomes likely driven by phylogenetic tracking.

## Chimpanzee (*Pan troglodytes verus*) Baobab (*Adansonia digitata*) Pounding: A new report from Dindéfelo, Senegal

Carlota F. Galán-Plana<sup>1</sup>, Andreu Sánchez-Megías<sup>1</sup>, Justinn Renelies-Hamilton<sup>1</sup>, Manuel Llana<sup>1</sup>, Laia Dotras<sup>1,2</sup>, Jordi Galbany<sup>1,3,4</sup> & R. Adriana Hernandez-Aguilar<sup>1,2,5</sup>

<sup>1</sup>Jane Goodall Institute Spain and Senegal. Dindéfelo Biological Station, Dindéfelo, Kedougou, Senegal. <sup>2</sup>Department of Social Psychology and Quantitative Psychology, Faculty of Psychology, University of Barcelona. Barcelona, Spain. <sup>3</sup>Department of Clinical Psychology and Psychobiology. Faculty of Psychology, University of Barcelona. Barcelona, Spain. <sup>4</sup>Institute of Neurosciences, University of Barcelona. Barcelona, Spain. <sup>5</sup>Serra Hunter Programme, Generalitat de Catalunya, Spain.

[carlyfj28@gmail.com](mailto:carlyfj28@gmail.com)

**Keywords:** Western chimpanzees, baobab smashing, camera traps, proto-tool use, anvil use

Wild chimpanzee (*Pan troglodytes*) percussive technology shows widespread behavioural variation across Africa. One type of such technology, baobab (*Adansonia digitata*) pounding, has been reported for Assirik and Fongoli (Senegal) and Bafing (Mali). However, the extent to which this proto-tool use behaviour varies between populations is poorly understood. Here we describe the baobab pounding behaviour of savanna chimpanzees from Dindéfelo, Senegal. We obtained indirect evidence of baobab pounding using primate archaeology techniques (e.g. fruit remnants smeared on anvil's surface) and camera trap footage analysis, and of baobab ingestion using macroscopical faecal analysis, throughout the three-month baobab fruiting season of 2021-2022. Dindéfelo chimpanzees exhibited two baobab pounding behaviours and one non-percussive baobab-opening technique. All age and sex classes performed baobab pounding, although adults seemed more successful. The chimpanzees used terrestrial and arboreal techniques to process baobab, both against wood and stone anvils. They used anvil-dependent baobab smashing, holding the fruit either by the stem or the pericarp. We recorded immature individuals engaging in play involving baobab pounding and observing the percussive behaviour of adults. In addition, our faecal analysis data suggest that baobab seed reingestion is common at Dindéfelo. Our findings broaden the knowledge of the diversity of chimpanzee baobab pounding behaviour.

### Functional anatomy of the chimpanzee upper limb in Barcelona Zoo

Marcel García-Cuesta<sup>1,2</sup>, Yasmina Avià<sup>3,4</sup>, Elisabeth Cuesta-Torralvo<sup>3,4</sup>, Josep Maria Potau Ginés<sup>1,4</sup> & Aroa Casado<sup>1,2,4,5</sup>

<sup>1</sup>Human Anatomy and Embryology Unit, University of Barcelona. Spain. <sup>2</sup>Department of Evolutionary Biology, Ecology and Environmental Sciences, University of Barcelona. Spain. <sup>3</sup>Biological Anthropology Unit - Physical Anthropology Area. Department of Animal Biology, Plant Biology and Ecology. Autonomous University of Barcelona. <sup>4</sup>Faculty of Geography and History, Institut d'Arqueologia de la Universitat de Barcelona, University of Barcelona. <sup>5</sup>Gimbernat University Schools (EUG) – Physiotherapy Degree.

[aroa.casado@ub.edu](mailto:aroa.casado@ub.edu)

**Keywords:** Functional anatomy, upper limb, locomotion, chimpanzee

The locomotor behaviour of chimpanzees has been extensively studied throughout the scientific literature. However, to date there are no observational studies on the specific functional anatomy of the chimpanzee upper limb. The project focuses on examining if laterality exists in the chimpanzee upper limb for specific actions. For this reason, for two weeks five observers have recorded -using focal RAR in phases of 30 minutes per individual- the movements of the upper limb of six of the seven individuals of the Barcelona Zoo. The excluded individual presented a body, posture and size pattern significantly different from the rest. The results of our study showed: a clear tendency to terrestrial behaviour in all primates, a pattern of use of the triphalangeal fingers in both extremities for low-precision actions, a predominant pattern of the finger 1 and 2 used as pincers and, a predominance of the fingers 1,2,3 to carry out precision actions. Differences in specific actions for both at the laterality level and at the individual level were also found. Therefore, the results of our preliminary study outline patterns of specific locomotor behaviour in the upper limb between individuals and between specific motor movements. In future studies, these data should be correlated with cognitive-behavioural data in order to understand more deeply the detected patterns.

### Quantitative analysis of hand muscle asymmetries in chimpanzees

Marcel García-Cuesta<sup>1,2</sup>, Aroa Casado Rodríguez<sup>1,2,3,4</sup>, Juan Francisco Pastor<sup>5</sup>, Félix de Paz<sup>5</sup>, Roberto Cabo<sup>6</sup> & Josep Maria Potau Ginés<sup>1,3</sup>

<sup>1</sup>Human Anatomy and Embryology Unit, University of Barcelona. Spain. <sup>2</sup>Department of Evolutionary Biology, Ecology and Environmental Sciences, University of Barcelona. Spain. <sup>3</sup>Faculty of Geography and History, Institut d'Arqueologia de la Universitat de Barcelona, University of Barcelona. <sup>4</sup>Gimbernat University Schools (EUG) – Physiotherapy Degree. <sup>5</sup>Department of Anatomy and Radiology, University of Valladolid. <sup>6</sup>SINPOS Research Group, Department of Morphology and Cell Biology, University of Oviedo.

[marcel.garciacuesta@gmail.com](mailto:marcel.garciacuesta@gmail.com)

**Keywords:** Laterality, chimpanzee, anatomy, hand, quantification

Manual laterality in apes, especially in *Pan troglodytes*, has been studied over the years, either by observing their hand use or on hand muscle dimensions. In this work, the functional anatomy of *Pan troglodytes*' hands was analysed to determine if this laterality is reflected in the hand muscles. To do so, muscle mass, physiological cross-sectional areas (PCSAs) and muscle fascicle lengths (MFLs) were evaluated in the muscles of previously dissected *Pan troglodytes*' hands. These comparisons were done by separating the muscles in functional groups. When comparing muscle mass percentages and PCSAs between left and right hands, there were no significant differences ( $p>0.30$  and  $p>0.50$ , respectively). However, when analysing MFLs, the right hypothenar eminence showed significant differences when compared to the right thenar and palmar functional groups ( $p=0.027$  and  $p=0.017$ , respectively). Meanwhile, these differences were not observed when evaluating left hands ( $p>0.08$ ). This asymmetry shows that the muscles controlling the fifth digit are faster when contracting in left hands than in right hands. Future research, specifically ethological analysis, is needed to continue evaluating hand laterality in chimpanzees.

### The figure of Jordi Sabater Pi. Some bio-historiographic data regarding his activity as a scientific divulgator of the origins of humanity

Margarida Genera i Monells

*ICHN (Institutió Catalana d'Història Natural-IEC), ICEK (Institut Català d'Espeleologia i Ciències del Karst), AEQUA (Asociación Española para el Estudio del Cuaternario), SEDPGYM (Sociedad Española para la Defensa del Patrimonio Geológico y Minero), SEHA (Sociedad Española de Historia de la Arqueología).*

[margaridagenera9@gmail.com](mailto:margaridagenera9@gmail.com)

**Keywords:** IKUNDE centre, Equatorial Guinea, human evolution, educational activity

The objective of this research is to provide some unpublished biohistoriographical data of Jordi Sabater Pi. Despite the temporal and geographical distance that separated me from the honored professor, at some moments in our life trajectory we maintained bonds of authentic collaboration and friendship, mainly in the work of early human behaviour and background. According to a chronological criterion, in this study we describe the precedents of what would later become the centre of Ikunde, located a few kilometres from Bata, the capital of Equatorial Guinea, in 1956, with some photographs of our family archive. Later, in 1959, a new space was directed by Sabater Pi himself, with the mission of supplying a large part of the zoological, ethnographic, archaeological and botanical collections to enrich the cultural facilities of the city of Barcelona, an activity that continued for approximately another decade. We continue with the phase dedicated to the teaching of courses and the assembly of exhibitions and, finally, the organization of seminars in different centres of the UNED. The presence of Floquet de Neu (Snowflake) in our city, for so many years, contributed to preserve clearly the fragments of the pages lived in Africa.

## Human evolution through the look of some paradigmatic drawers

Margarida Genera i Monells

*ICHN (Institució Catalana d'Història Natural), ICEK (Institut Català d'Espeleologia i Ciències del Karst), AEQUA (Asociación Española para el Estudio del Cuaternario), SEDPGYM (Sociedad Española para la Protección del Patrimonio Geológico y Minero), SEHA (Sociedad Española de Historia de la Arqueología).*

[margaridagenera9@gmail.com](mailto:margaridagenera9@gmail.com)

**Keywords:** Scientific drawing, Pierre Laurent, Julià Riu Serra, Mauricio Antón, Pilarín Bayès, Francesc Riart

This research pretends to exalt the figure of Dr. Jordi Sabater Pi, in particular his facet as a scientific draftsman, providing some reflections on drawing as a universal language that allows not only to record, document and describe certain elements with all rigor, but also transmit contents of great complexity in an intelligible way to society in general, impregnating them with feelings infused by the author himself. In order to provide more information and contextualize his work as a divulgator of the behaviour of primates -without detaching them from the evolutionary tree of “primigenius” humans- we also include some considerations regarding other extraordinary illustrators who, with very different styles, have focused on said theme. The level of excellence achieved by Professor Sabater Pi through his drawings encourages the viewer to delight in the great plastic beauty and feel the emotion of delving into the knowledge of these beings so close to us. Ultimately, the sensitivity and tenderness of the representations evoke the desire to protect and preserve nature, as its author diffused with vehemence and conviction throughout his entire life.

## Personality assessment in great apes: a comparative approach between behavioural coding and trait rating

Albert Giberga<sup>1,2</sup>, Maria Padrell<sup>3</sup>, Federica Amici<sup>4,5</sup>, Sara Ortín<sup>1,6</sup>, Yulán Úbeda<sup>3</sup> & Miquel Llorente<sup>1,3</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, Girona, Spain. <sup>2</sup>Grup de Recerca en Cognició i Llenguatge, Universitat Oberta de Catalunya, Barcelona, Spain. <sup>3</sup>Grup de Recerca “Llenguatge i Cognició”, Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Girona, Spain. <sup>4</sup>Research Group “Primate Behavioural Ecology”, Department of Human Behaviour, Ecology and Culture, Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany. <sup>5</sup>Behavioural Ecology Research Group, University of Leipzig Faculty of Life Science, Institute of Biology, Leipzig, Germany. <sup>6</sup>Zambia Primate Project, Zambia.

[agiberga@uoc.edu](mailto:agiberga@uoc.edu)

**Keywords:** great ape personality, 16 PF questionnaire, primates, behaviour, convergent validity

Questionnaires are the most common approach to assess personality in animals due to their practical, integrative and flexible application. In primates, this approach has been widely applied based on human personality models such as the Five Factor Model. Nevertheless, these questionnaires are usually long and require considerable time to carry out the assessment. Here, we developed a validation of the Sixteen Personality Factors Questionnaire (16PF) adapted for non-human primates, which provides a shorter tool for the evaluation of personality traits. We performed a Principal Component Analyses including 121 chimpanzees and identified 5 personality dimensions with high interrater reliabilities —Extraversion, Anxiety, Dominance, Self-control and Intellect— that reflected a similar personality structure to those found

in humans and nonhuman great apes. Additionally, personality ratings were related to behavioural indices extracted from observations and cognitive testing data for 26 apes including bonobos, gorillas and orangutans. Overall, the associations established did not reach the significance level, with the exceptions of Dominance, Apprehension and Self-reliance, which correlated with individual's rank, self-directed behaviour and degree-centrality values, respectively. Our findings show the potential validity of the 16PF model for personality assessment in great apes, with an extensive construct validity necessary to systematically capture the predicted behavioural variables.

## Do neighbours matter? How intergroup interactions affect the social networks of adjoining chimpanzee groups

Jose Gil-Dolz<sup>1</sup>, Dietmar Crailsheim<sup>2</sup> & David Riba<sup>2,3</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, Girona, Spain. <sup>2</sup>Research Department, Fundació MONA, Riudellots de la Selva, Spain. <sup>3</sup>Facultat de Lletres, Universitat de Girona, 17003 Girona, Spain.

[josegd98@gmail.com](mailto:josegd98@gmail.com)

**Keywords:** social network analysis, chimpanzee, primate, well-being, social interactions

Chimpanzees live in large communities of up to 150 individuals, with complex social structures and dynamics. This complexity results of changes in group composition due to fission-fusion dynamics. In captivity, group sizes are usually smaller, thus social complexity is lesser. However, groups can be housed in adjoining habitats, potentially increasing the number of social partners, i.e. interactions and social complexity. While most social network-based research analyses groups as closed systems, this study aimed to assess the impact of social interactions between two groups of chimpanzees, based on two social network indices, measuring the strength (Vertex strength centrality) and the distribution (Deviation from edge weight disparity) of the interactions. Furthermore, LMMs were conducted to assess if gender, age, and intra/inter-group directionality influenced these indices. For this, we recorded occurrences of social interactions, social proximity, and whether chimpanzees observed individuals in the other group as a measure of interest. Most social interactions were directed towards members of their own group, however, 13% were directed towards the neighbouring group. These findings suggest that although they lack physical contact, interactions between neighbouring groups occur frequently enough to be considered an important component of their social network, as well as their well-being.

## Temporal stability of social networks in captive tufted capuchin monkeys (*Sapajus apella*) after the separation of part of the group

Paula González Bermejo, María Alicia Luján Rodríguez, Sergio Díaz González & Ana María Fidalgo de las Heras

*Universidad Autónoma de Madrid.*

[paulagonzalezbermejo99@gmail.com](mailto:paulagonzalezbermejo99@gmail.com)

**Keywords:** Social structure, temporal stability, social networks, proximity, *Sapajus apella*.

It is frequent that groups of captive primates change because of the members' withdrawal. In this study we analyse the social structure of the remaining group of Tufted Capuchin Monkeys (*Sapajus apella*) formed



by eight resident individuals in Faunia (Madrid), after the transfer of part of its members to another animal park. The study was conducted during one month, and use social network analysis based on proximity data collected through observations to explore if it remains stable throughout that time. We hypothesized the transfer of part of the group members leads to a change in the social relationships of the group. However, results show that monkeys established similar associations during the 3 time periods, showing high positive correlations ( $p < 0.001$ ;  $p = 0.0064$ ;  $p = 0.0422$ ). This is a welfare indicator that shows that the withdrawal of part of the members of the original group did not create short-term stress for the group that stays still at Faunia.

### **The environmental enrichment of primate enclosures in Spanish zoos thirteen years after the introduction of the Law 31/2003**

Federico Guillén-Salazar<sup>1</sup> & Gemma Pons-Salvador<sup>2</sup>

<sup>1</sup>*Ethology and Animal Welfare Section, Universidad Cardenal Herrera-CEU, CEU Universities, Valencia, Spain.* <sup>2</sup>*Department of Basic Psychology, Universitat de València, Spain.*

[fguillen@uchceu.es](mailto:fguillen@uchceu.es)

**Keywords:** Zoo legislation, welfare, environmental enrichment, enclosure assessment, longitudinal study

Law 31/2003 was the first legislation to regulate zoo roles in Spain. Article 3 establishes a series of welfare requirements applicable to zoos, including accommodate their animals under conditions which aim to satisfy the biological requirements of the individual species by providing species specific enrichment of the enclosures. Here we present the results of a longitudinal study in which we compare the suitability of the enclosures at the time of the implementation of the Law 31/2003 (2003-2004; 285 enclosures from 48 zoos) and thirteen years later (2016-2017; 322 enclosures from 41 zoos). The evaluation of the enclosures was carried out in both periods through the application of an evaluation guide specifically developed for this task. We assessed enclosure suitability by evaluating in each enclosure seven aspects related to the provision of certain environmental resources, needed by an animal to satisfy some of its main biological needs and, therefore, improve its welfare. An enclosure was considered to provide a suitable environment for the species housed only when all seven aspects were fulfilled. Our results show a significant increase in the percentage of enclosures that meet all seven criteria after introduction of Law 31/2003 (54.39% in 2003-2004 to 87.88% in 2016-2017), as well as in the percentage of zoos in which all of their enclosures meet all seven criteria (19.15% in 2003-2004 to 51.22% in 2016-2017).

### **Orangutan Welfare Evaluation Project: establishing a longitudinal welfare monitoring project at the Barcelona Zoo**

Melissa Guinot<sup>1</sup>, Eva Corral<sup>1</sup>, Helena García-Saura<sup>1</sup>, Sandra Castells<sup>1</sup>, Josep Maria Alonso<sup>2</sup>, Maria Teresa Abelló<sup>3</sup> & Miquel Llorente<sup>1,4</sup>

<sup>1</sup>*Fundació UdG: Innovació i Formació, Universitat de Girona, Girona, Spain.* <sup>2</sup>*Research and Conservation Department, Barcelona Zoo, Spain.* <sup>3</sup>*Primate Section, Barcelona Zoo, Spain.* <sup>4</sup>*Serra Hünter Fellow, Grup de Recerca "Llenguatge i Cognició", Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Girona, Spain.*

[meelissa96@hotmail.com](mailto:meelissa96@hotmail.com)

**Keywords:** Longitudinal monitoring, welfare, zoo animals, space use

Longitudinal studies are fundamental in the evaluation and monitoring of animal welfare. We present the first dataset of a longitudinal project established in 2022 with the group of orangutans (n=6) at the Barcelona Zoo with the aim of longitudinally assessing the well-being of individuals. We evaluated the frequency and diversity of the activity budget and the use of space during 30 hours using focal all occurrences and instantaneous scan sampling methods. We analysed data at individual and at group level to describe the individual behavioural profiles. We found that the individuals spent at least two times more resting than in locomotion or feeding. Animals displayed a tendency to rest less and feed more with access to the outdoors areas. However, the locomotion was similar with opened and closed enclosures. Regarding the use of space, the heat maps indicated a similar use of indoors and outdoors, resting more frequently far from windows inside and outside, and in the heights in the outdoors. The activity budget is spent mainly in the floor (60%) followed by the platforms (23%). Platforms are used mainly for resting (86%), followed by feeding (6%). This baseline information is crucial to monitor the status of individuals over time tracking their well-being.

### Assessing food enrichment with life insects on four species of captive primates

Antonio Andrés Herrero Reyes<sup>1</sup>, Hugo Cano Fernández<sup>2</sup>, José Galián<sup>1,3</sup>, Gema Pardo<sup>4</sup> & Josefina Zapata<sup>1</sup>

<sup>1</sup>Department of Zoology and Physical Anthropology, University of Murcia. Espinardo 30100, Murcia.

<sup>2</sup>Department of Genetics and Microbiology, Autonomous University of Barcelona, Cerdanyola del Vallès 08193, Spain. <sup>3</sup>ArthropoTech SL, Campus Espinardo, Vitalis Building, 2<sup>nd</sup> floor, office 2.15 University of Murcia 30100 Murcia, Spain. <sup>4</sup>Terra Natura Murcia. Espinardo 30100, Murcia.

[antonioandres.herreror@um.es](mailto:antonioandres.herreror@um.es)

**Keywords:** Environmental enrichment, primates, wellbeing, insects, container

**Objective.** Environmental enrichment is a procedure used to improve animal wellbeing. This study aimed to measure the interest of captive non-human primates in a variety of insects and challenging containers that could potentially be used as environmental enrichment. **Methods.** Different species of non-human primates (*Varecia variegata* N=3, *Lemur catta* N=4, *Colobus guereza* N=2 and *Cercopithecus neglectus* N=3) were presented with insects (*Shelfordella tartara*, *Tenebrio molitor* and *Zophobas morio*) inside changing containers (bamboo canes, esparto nets and leave-made canisters). Each primate species was exposed once to each combination of insect species and container. The interest was measured by recording the number of interactions with the container and the time invested in those interactions. **Results**

Results show that the primate species that more often interacted with the insects was *C. neglectus*. Lemurs showed a low number of interactions, probably due to interspecific competition (both species were housed in the same enclosure). Colobus were barely interested in the insects, probably due to the fact that this species is folivorous. Within a primate species, there were no differences in the number of interactions between different insects or containers. **Conclusions.** The dietary preferences and intra/inter-specific competition have to be carefully considered when designing enrichment programmes.

### Seasonal variability in group sizes of the Gashaka chimpanzees

Gonçalo Jesus<sup>1,2</sup>, Umaru Bubba<sup>3</sup> & Volker Sommer<sup>4</sup>

<sup>1</sup>*Escola de Psicologia e Ciências da Vida, Universidade Lusófona de Humanidades e Tecnologias, Portugal.* <sup>2</sup>*Centro de Investigação em Antropologia e Saúde, Universidade de Coimbra, Portugal.* <sup>3</sup>*Taraba State University, Nigeria.* <sup>4</sup>*Department of Anthropology, University College London, U.K.*

[goncalo.jesus@ulusofona.pt](mailto:goncalo.jesus@ulusofona.pt)

**Keywords:** Chimpanzees, seasonality, group size, fruit distribution

The Nigeria-Cameroon chimpanzee (*Pan troglodytes ellioti*) is restricted to areas between the Sanaga River in Cameroon and rivers Niger and Benue in Nigeria and is the least studied chimpanzee sub-species. For over a decade the Gashaka Primate Project collected data on a community of non-habituated chimpanzees within the Gashaka Gumti National Park, Nigeria which harbours probably the largest population of *P.t ellioti*. We present data derived from circa 200 sightings and more than 300 locations of nesting sites recorded over 14 years for a single chimpanzee community with (a minimum of) 35 members and an estimated home range of about 27.5 Km<sup>2</sup>. The marked seasonality of the Gashaka area influences fruit production and thus is expected to effect grouping patterns of the chimpanzees. We didn't find a significant variance in day group size, but found a positive correlation between fruit availability and nest group sizes. These dynamics are probably caused by foraging constraints as food patches seldom occur in large clusters. As the number of food patches increases chimpanzee parties can forage in closer proximity and therefore, given reduced travel costs, chimpanzee day groups can merge more easily when nightfall is approaching, compared to periods when patches are more spaced-out.

## A decade of the Master's Degree in Primatology at the University of Girona

Miquel Llorente<sup>1,2</sup> & Suani Armisen<sup>1</sup>

<sup>1</sup>*Fundació UdG: Innovació i Formació, Universitat de Girona, Carrer Pic de Peguera 11, 17003 Girona, Spain.* <sup>2</sup>*Serra Húnter Fellow, Grup de Recerca "Llenguatge i Cognició", Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Plaça Sant Domènec 9, 17004 Girona, Spain.*

[miquel.llorente@fundacioudg.org](mailto:miquel.llorente@fundacioudg.org)

**Keywords:** primatology, training, education programmes, primate behaviour, e-learning

Primatology become crucial for understanding the evolution of human behaviour and for protecting and conserving these species, both in the wild and in captivity. Postgraduate training programmes are essential to train future professionals to study, perform research and protect these species. In Spain, and especially in Spanish-speaking countries, training opportunities are scarce. The postgraduate and Master's degree Programme in Primatology at the University of Girona was launched in 2013. During these 10 years, the aim of the programme has been to train scientists and professionals in areas such as behaviour, cognition, welfare, conservation and any other subject related to non-human primates. From the beginning, the programme has a comparative, evolutionary and transdisciplinary approach, with a team of professors composed by primatologists, biologists, psychologists, ethologists, ecologists, veterinarians, anthropologists, and archaeologists. In total, we have had 214 students from 16 countries with an academic background of Biology, Psychology and Veterinary Medicine, mainly. Our students developed their internships and research projects in 65 collaborating centres around the world (33 countries). Since 2020 the programme adopted a blended modality (e-learning + in person), facilitating access to new students who do not live in Girona or Catalonia.

## Personality and psychological disorders are related in ex-pet and ex-performer chimpanzees. A preliminary investigation

Miquel Llorente<sup>1</sup>, Jaume Fatjó<sup>2,3</sup>, Carles Rostán<sup>1</sup> & Yulán Úbeda<sup>1</sup>

<sup>1</sup>*Departament de Psicologia, Universitat de Girona, Girona, Spain.* <sup>2</sup>*Institut de Recerca i Estudis en Primatologia - IPRIM, Santa Cristina d'Aro, Girona, Spain.* <sup>3</sup>*Department de Psiquiatria i Medicina Legal, Càtedra Fundació Affinity Animals y Salud, Universitat Autònoma de Barcelona, Bellaterra, Spain.*

[miquel.llorente@fundacioudg.org](mailto:miquel.llorente@fundacioudg.org)

**Keywords:** chimpanzees, psychopathology, personality, DSM, animal welfare

In humans, individual variation across personality traits have been found to associate with mental health outcomes. However, to our knowledge no studies have been carried out on this area in animals. In this sense, chimpanzees represent a promising model from an evolutionary and comparative perspective. Therefore, studies conducted on the psychopathology-personality axis on this species can contribute to the new transdiagnostic paradigm in human mental health (the National Institute of Mental Health's RDoC initiative). Our goal in the current study was to evaluate the links between higher order traits and main disorders in a group ex-pet and ex-performer chimpanzees. We explored the correlations between personality traits —based on Five-Factor Model (FFM) and Eysenck's Psychoticism-Extraversion-Neuroticism (PEN) model— and main categories of mental disorders —based on the adaptation of the Diagnostic and Statistical Manual of Mental Disorders (DSM)—. We found strong correlations similar to some of the main associations identified for humans, including: a positive correlation between neuroticism and anxiety disorders, and a negative correlation between extraversion and depressive disorders, among others. Therefore, our results evidenced the critical role of personality on the development of psychological disorders in chimpanzees.

## PRIMLAT: Hand preferences for bimanual coordinated tasks in nonhuman primates: a comparative study in 22 primate species

Miquel Llorente<sup>1,2,3</sup>, Dmitry Ocunski<sup>1</sup>, Leandre Murhula Masirika<sup>4</sup>, Itsaso Vélez del Burgo<sup>4</sup> & Laura Simó<sup>5</sup>

<sup>1</sup>*Fundació UdG: Innovació i Formació, Universitat de Girona, Girona, Spain.* <sup>2</sup>*Serra Hùnter Fellow, Grup de Recerca "Llenguatge i Cognició", Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Girona, Spain.* <sup>3</sup>*Institut de Recerca i Estudis en Primatologia, IPRIM, 17246 Santa Cristina d'Aro, Spain.* <sup>4</sup>*Lwiro Primates Rehabilitation Center, Lwiro, South Kivu, Democratic Republic of Congo.* <sup>5</sup>*Facultat de Ciències i Tecnologia, Universitat de Vic-Universitat Central de Catalunya, Vic, Spain.*

[miquel.llorente@fundacioudg.org](mailto:miquel.llorente@fundacioudg.org)

**Keywords:** Handedness, tube task, laterality, brain specialization

Brain lateralisation and its link with hand preference has been a highly studied topic in humans and recently among nonhuman primates (NHP). Particularly, bimanual coordinated task (e.g. tube task) has been commonly used to test hand preferences in NHP. Nevertheless, several primate species remain poorly evaluated. We aimed to contribute to the dataset of hand preferences in NHP evaluating 127 subjects corresponding to 22 species (16 Haplorrhini and 6 Strepsirrhini) housed in three sites (Bioparc Valencia, El Bosque and Lwiro). We evaluated hand preferences at individual and group level, and the feasibility of the «tube task» as an adequate evaluation task in several primate species. We found that only Haplorrhini

species participated in the task (n=76; 87% rate of participation), and 5 participating individuals were eliminated from the laterality analysis due to insufficient number of manual actions. At individual level, 86% of the final sample was lateralised: 51% were right-handed and 49% left-handed. Food extractions were made mainly with index finger (78%) and finger 1 (8%) and finger 2+3 (9%). At population level, we did not detect significant manual preferences for the whole sample but *Cercopithecus ascanius* and *Chlorocebus cynosuros* were significantly left-handed and right-handed, respectively.

### Termite-mound task and tool-use behaviour in sanctuary-housed chimpanzees.

Kevin López-Leal<sup>1,2</sup>, Adrián Arroyo<sup>3,4</sup> & David Riba<sup>1,5</sup>

<sup>1</sup>Fundació Mona, Research Department, 17457, Girona, Spain. <sup>2</sup>Universitat de Girona (UdG), Màster de Primatologia, Girona, Spain. <sup>3</sup>Institut Català de Paleoecologia Humana i Evolució Social (IPHES-CERCA), Zona Educacional 4, Campus Sescelades URV (Edifici W3), 43007, Tarragona, Spain. <sup>4</sup>Universitat Rovira i Virgili (URV), Àrea de Prehistòria, Avinguda de Catalunya 35, 43002, Tarragona, Spain. <sup>5</sup>Facultat de Lletres, Universitat de Girona, 17003, Girona, Spain.

[lopezlealkevin@gmail.com](mailto:lopezlealkevin@gmail.com)

**Keywords:** Tool use, Termite-fishing, chimpanzees, grips

Chimpanzees are the most prolific non-human primate tool users and the most extensives as well amongst non-human great apes. Previous research has been focused on stone tools or manual consistency across tool use tasks, but here we aim to evaluate the behaviour of the termite mound task in two groups of chimpanzees (n=14) under semi-captive conditions. For such purpose, we analysed recorded videos of the termite-fishing task (using Focal scan sampling, 10min/individual) performed by chimpanzees from the Mona Foundation (Girona, Spain). We carried out several separate linear mixed models (LMM) to assess the significance of group, age, sex, use and type of tools, posture and type of substrate in the termite mound behaviour. Results revealed significant effects on the social group variable, as well as posture, substrate, and tool type variables. Our results contribute to improving the knowledge of tool-use on semi-captive chimpanzee groups, while our methodological approach to code captive tool use behaviours can be used to other chimpanzee sanctuaries or even in the wild.

### Personality and behavioural stability in robust capuchin monkeys (*Sapajus apella*) after a group change in Faunia

María Alicia Luján Rodríguez, Paula González Bermejo, Sergio Díaz González & Ana María Fidalgo de las Heras

*Universidad Autónoma de Madrid.*

[alicia\\_lujan13@hotmail.com](mailto:alicia_lujan13@hotmail.com)

**Keywords:** Robust capuchins (*Sapajus apella*), personality in animals, stability, change in the group, correlations

The aim of this work is to carry out a pilot study based on the personality of the 8 robust capuchin monkeys of Faunia (Madrid) to analyse the possible influence on their behavioural stability produced by the removal of some members from the group. In order to test behavioural stability, this study investigated the relationship between personality measured through questionnaires and observed behaviour. In general,

the results obtained throughout this research show a low correlation ( $p < 0.05$ ). However, three significant correlations have been found: the first one is between grooming behaviour and popularity item ( $r = -0.785$ ,  $p < 0.05$ ), the second relates alert behaviour with reciprocity item ( $r = 0.822$ ,  $p < 0.05$ ), and the last correlation to take in consideration, although it is not significant enough, is between locomotive behaviour with creativity item ( $r = 0.700$ ,  $p = 0.053$ ). Consequently, if only three correlations have been obtained between all variables, it seems that it has been observed a slight behavioural destabilization in the sample just after the separation of half of the group. Therefore, it would be logical to associate this temporal variation of behaviours to the stressful removal of a part of the social group.

### **Savanna Chimpanzee (*Pan troglodytes verus*) Nesting Tree Species Abundance in Dindefelo (Senegal): Implications for conservation**

Samba Macina<sup>1</sup>, Laia Dotras<sup>2,3</sup>, Manuel Llana<sup>2</sup>, R. Adriana Hernandez-Aguilar<sup>2,3,4\*</sup> & Papa I. Ndiaye<sup>1\*</sup>

<sup>1</sup>Department of Animal Biology, Faculty of Science and Technology, University of Cheikh Anta Diop, Dakar, Senegal. <sup>2</sup>Jane Goodall Institute Spain and Senegal, Dindefelo Biological Station, Dindefelo, Kedougou, Senegal. <sup>3</sup>Department of Social Psychology and Quantitative Psychology, Faculty of Psychology, University of Barcelona, Barcelona, Spain. <sup>4</sup>Serra Hunter Programme, Generalitat de Catalunya, Spain.

\* These senior authors jointly supervised this work

[r.a.hernandez-a@ub.edu](mailto:r.a.hernandez-a@ub.edu)

**Keywords:** Western chimpanzees, chimpanzee nesting patterns, tree resources, Dindefelo community Nature Reserve, Kedougou

Chimpanzees (*Pan troglodytes verus*) in Senegal are threaten by anthropogenic activities that compromise their conservation. The tree species chimpanzees use to build their sleeping nests are critical resources for their survival. We assessed the abundance of the species most frequently used for nesting by chimpanzees at the Dindefelo Community Nature Reserve (Senegal) to contribute to designing strategies for conserving their nesting resources. From January to March 2021, we used line transects (38.5 km total) and reconnaissance walks to record chimpanzee nests, and vegetation plots (25x25m every 250m along transects) to assess the abundance of nesting species in our study site. Mean nest height was 7m (N=136) and most nests (82%) were  $\leq 10$ m in height. Of the 26 species used for nest making by Dindefelo chimpanzees, only seven accounted for 72% of their nests. We recorded a total of 1894 individual trees ( $\geq 10$ cm in diameter at breast height) in vegetation plots, belonging to 64 different species. Except for two species, Dindefelo chimpanzees used tree species in proportions that did not correspond to their abundance. Our study highlights the importance of including the nesting tree species most frequently used by chimpanzees in designing conservation strategies for this Critically Endangered subspecies.

### **Savanna chimpanzees (*Pan troglodytes verus*) in Guinea use caves: New data from Sabe**

Marta Marcos-Nistal<sup>1</sup>, Carlota F. Galán-Plana<sup>1</sup>, María C. Gallego-Acero<sup>1</sup>, Laia Dotras<sup>1,2</sup>, Jordi Galbany<sup>1,3,4</sup>, Manuel Llana<sup>1</sup>, Amanda Barciela<sup>1</sup> & R. Adriana Hernandez-Aguilar<sup>1,2,5</sup>

<sup>1</sup>Jane Goodall Institute Spain and Senegal, Dindéfelo Biological Station, Dindéfelo, Kedougou, Senegal. <sup>2</sup>Department of Social Psychology and Quantitative Psychology, Faculty of Psychology, University of Barcelona, Barcelona, Spain. <sup>3</sup>Department of Clinical Psychology and Psychobiology, Faculty of Psychology, University of Barcelona, Barcelona, Spain. <sup>4</sup>Institute of Neurosciences, University of Barcelona. Barcelona, Spain. <sup>5</sup>Serra Hunter Programme, Generalitat de Catalunya, Spain.

[martamarcosn@gmail.com](mailto:martamarcosn@gmail.com)

**Keywords:** Western chimpanzees, camera traps, thermoregulation, dry season, high temperatures.

Western chimpanzees (*Pan troglodytes verus*) in Senegal and Mali use caves to rest during the day, especially during the hot dry season, presumably for their thermoregulatory benefits. In this study, 1056 chimpanzee videos (totalling 507 min) from camera traps located inside and outside Sahoro's cave in Sabe (Guinea), recorded between 2018 and 2020, were analysed using a continuous multifocal sampling method. Our aim was to describe chimpanzee cave use behaviours in terms of frequency and duration, season and time of day. We predicted that if chimpanzees used the cave for thermoregulation, they would do so during the hottest hours of the day, and mainly for resting. Similar to other studies, Sabe chimpanzees used Sahoro's cave to rest during the hottest part of the day in the dry season, providing support for the thermoregulatory function of caves. Females were more frequently recorded using the cave and staying longer than males (86% of behavioural records). Olive baboons (*Papio anubis*) and green monkeys (*Chlorocebus sabaeus*) were also recorded (70 videos totalling 33 min). Our study is the first to report cave use by chimpanzees in Guinea. It also helps to better understand chimpanzee behavioural adaptations to savanna hot, dry and open habitats.

### **Could the local factors modified the social parameters in semi-freedom macaques groups? Exploratory study in semi-free ranging *Macaca tonkeana* and *Macaca fascicularis* groups**

Laura Mármol<sup>1</sup>, H  l  ne Meunier<sup>2,3</sup>, Ruth Dolado<sup>1,4</sup> & Francesc S. Beltran<sup>1,4</sup>

<sup>1</sup>Institute of Neurosciences (neuroUB), Universitat de Barcelona, Spain. <sup>2</sup>Centre de Primatologie, Universit   de Strasbourg, Niederhausbergen, France. <sup>3</sup>Laboratoire de Neurosciences Cognitives et Adaptatives, CNRS and Universit   de Strasbourg, France. <sup>4</sup>Department of Social Psychology and Quantitative Psychology, University of Barcelona, Spain.

[lauramarmolg@gmail.com](mailto:lauramarmolg@gmail.com)

**Keywords:** *Macaca*, social styles, social parameters, local factors, captivity

The species of the genus *Macaca* are classified into four social styles based on aggression and affiliative patterns. However, some studies show that the social parameters change under different local conditions, mainly under captivity. Thus, in social structure studies, it is necessary to take into account the factors relating to the captivity conditions of studied groups. The aim of our study was to verify if the social parameters of two groups of macaques in semi-free ranging coincides with the macaques' social styles. Our hypothesis was that the social parameters of our groups would not be in line with those corresponding to the social style of each species. The study was carried out in *Centre de Primatologie* at Strasbourg. We studied a group of *Macaca tonkeana* (9 individuals) and a group of *Macaca fascicularis* (9 individuals). Our results were in line with the hypothesis, since some of the social parameters of our groups were inconsistent with those expected according to the social style grade to which our species belonged. Therefore, the model

that classified the species of *Macaca* genus into four different grades of social styles should be reviewed, because some local factors can modify the social parameters of the groups.

## **New master training programme in scientific illustration in the natural sciences**

Blanca Martí de Ahumada<sup>1</sup>, Carles Puche<sup>1</sup>, Suani Armisen<sup>1,2</sup> & Miquel Llorente<sup>1,2,3</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, Carrer Pic de Peguera 11, 17003 Girona, Spain. <sup>2</sup>Institut de Recerca i Estudis en Primatologia - IPRIM, 17246 Santa Cristina d'Aro, Girona, Spain.

<sup>3</sup>Serra Húnter Fellow, Grup de Recerca "Llenguatge i Cognició", Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Plaça Sant Domènec 9, 17004 Girona, Spain.

[blancamarti.ahumada@gmail.com](mailto:blancamarti.ahumada@gmail.com)

**Keywords:** scientific illustration, drawing, science communication, art, dissemination

Scientific and naturalistic illustration has been an essential media and tool for dissemination of science. This discipline, that connect art and science, has been historically applied to several disciplines such as medicine, astronomy, archaeology, palaeontology, botany, zoology, animal behaviour or primatology. We present a new Master programme in Scientific Illustration of Natural Sciences organised by the University of Girona that represents one of the few postgraduate programmes in this specific topic in Spain. We aim to provide basic knowledge about the discipline, giving the tools to discover the necessary competences to develop professionally as a scientific illustrator. The master is focused on its application to basic and applied research, environmental education and science dissemination, among others. The course is addressed to professionals and students of Biology, Veterinary and Environmental Sciences, environmental educators and naturalists, palaeontologists or illustrators, among others. The training has a very practical approach, combining traditional and digital techniques. Field work is the basic and differential element, allowing the student to learn by observation and personal experience. Finally, the programme aims to reclaim the important role of illustration and illustrators in the development of the natural sciences, including Primatology.

## **Behavioural response to maternal loss in captive juvenile Western Lowland Gorillas (*Gorilla gorilla gorilla*)**

Raquel Martínez Gutiérrez

*Facultat de Biologia. Universitat de Barcelona.*

[rmartigu8@alumnes.ub.edu](mailto:rmartigu8@alumnes.ub.edu)

**Keywords:** Maternal loss, behavioural response, western lowland gorilla, stress, captivity

In great apes the loss of the mother before adulthood forces the individuals to manage a stressful situation, as it compromises their physical and cognitive development. Observations made in the wild have described the behavioural response to maternal loss in gorilla offspring, which is based on an increase of social relationships, especially with the dominant male of the group. To approach this phenomenon in captivity, we have studied the response to maternal loss of two juvenile females of Western Lowland gorillas (*Gorilla gorilla gorilla*) housed in two zoological institutions. Data were collected using a category system previously built and a continuous focal sampling method along sessions of fifteen minutes. We have compared the behaviour rates of the categories Affiliative, Agonism, Feed and Social Play of the two juveniles before and after the maternal losses and found that their responses to the loss have been very different, although they



are of the same age and belong to similar family groups. A careful descriptive analysis of the data reveal that, in this case, factors like the hierarchical position of the juvenile and the role of the dominant male in the group are relevant in determining the type of response to maternal death.

### Effects of the death of an intimately familiar group member on the behaviour of two former pet and entertainment chimpanzees

Martí Masip<sup>1</sup>, Olga Feliu<sup>1,2</sup>, Carme Maté<sup>3</sup>, Sònia Sánchez-López<sup>4</sup>, Dietmar Crailsheim<sup>1</sup> & Elfriede Kalcher-Sommersguter<sup>5</sup>

<sup>1</sup>Research Department, Fundació Mona, 17457 Girona. <sup>2</sup>Department of Clinical Psychology and Psychobiology, Faculty of Psychology, University of Barcelona, 08035 Barcelona, Spain. <sup>3</sup>Department of Animal Rights, Barcelona City Council, C/Perez Galdós 24-26, 08012 Barcelona, Spain. <sup>4</sup>Area of Psychobiology, Faculty of Psychology and Educational Sciences, Universitat Oberta de Catalunya, 08018 Barcelona, Spain. <sup>5</sup>Institute of Biology, University of Graz, 8010 Graz, Austria.

[mona3@fundacionmona.org](mailto:mona3@fundacionmona.org)

**Keywords:** *Pan troglodytes*, pet & entertainment industry, activity budget, social network, well-being, death

Anecdotal evidence suggests that chimpanzees are affected by the death of a familiar group member. In the present case study, we compared the activity budget and the social networks of two chimpanzees almost a decade post-rescue to the time shortly after the death of their companion, with whom they had lived together for more than 25 years. We hypothesized that the death of a conspecific, who they were rescued with and with whom they maintained the closest relationship at the MONA rescue centre, would affect their behaviour. The death of one of the two females caused profound changes in the other female's activity budget as abnormal behaviour and vigilance increased, while feeding behaviour and resting decreased compared to the time when living at the sanctuary for about 10 years. It was less obvious in the male's activity budget, however, noticeable in an increase in agonistic behaviour and a decrease in allogrooming. Time spent engaged in allogrooming decreased in the female as well. Both chimpanzees had weaker allogrooming networks but densified their proximity networks compared to those a decade post-rescue. Consequently, we assume that both individuals are affected by the death of their companion.

### Assessment of the occurrence of abnormal behaviours in chimpanzees housed at a primate rescue centre.

Iria Merino-Sánchez<sup>1,2</sup>, Ana Pérez-Cembranos<sup>3</sup> & Dietmar Crailsheim<sup>2</sup>

<sup>1</sup>Facultad de Biología, Universidad de Salamanca, 37007, Salamanca, Spain. <sup>2</sup>Research Department, Fundació Mona, 17457 Girona, Spain. <sup>3</sup>Departamento de Biología Animal, Facultad de Biología, Universidad de Salamanca, 37007, Salamanca, Spain.

[iriamers@usal.es](mailto:iriamers@usal.es)

**Keywords:** chimpanzee, abnormal behaviours, animal welfare, trauma, enrichment

Chimpanzees (*Pan troglodytes*) housed at rescue centres typically endured adverse living conditions including maternal deprivation, social deprivation, lack of stimulation and excessive exposure to humans. Their past and ongoing traumatic situations, combined with endogenous factors, may lead to critical effects on their psychological, physiological and emotional states and potentially provoke the development of

abnormal behaviours. We conducted 250 hours of observations using multifocal instantaneous scan sampling in 2-minute intervals in order to analyse (chi-square test) the occurrence, prevalence, average and individual differences of abnormal behaviours and how these were affected by climatic conditions (rainy, sunny, cloudy) and the provision of enrichment (i.e. foraging puzzles, artificial termite mounds, patchwork blankets, etc.) at Fundació MONA (N=12). Furthermore, we investigated in which abnormal behaviours objects were used.

Chimpanzees were observed exhibiting seven types of abnormal behaviours, such as overgrooming and coprophagia. Our results show an increase in abnormal behaviours on rainy and cloudy days compared to sunny days and a reduction when enrichment was provided. Objects were only used in self-scratch/poke. In conclusion, conditions such as climate and enrichment should be taken into account in studies regarding abnormal behaviour, as they may influence the occurrence of these behaviours.

### Conservation genetics of the red colobus monkeys from Gola Rainforest National Park, Sierra Leone

Tânia Minhós<sup>1,2</sup>, Filipa Borges<sup>1,2,3</sup>, Isa Aleixo-Pais<sup>1,4</sup>, Maria Ferreira da Silva<sup>5</sup>, Benjamim Barca<sup>6</sup>, Brima Turay<sup>6</sup> & Darya Sevastópolska<sup>1,2</sup>

<sup>1</sup>Centre for Research in Anthropology (CRIA –NOVA FCSH), Lisbon, Portugal. <sup>2</sup>Department of Anthropology, School of Social Sciences and Humanities, Universidade Nova de Lisboa, Lisbon, Portugal. <sup>3</sup>Instituto Gulbenkian de Ciência, Oeiras, Portugal. <sup>4</sup>School of Biosciences, Cardiff University, Wales, United Kingdom. <sup>5</sup>CIBIO/InBio, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Portugal. <sup>6</sup>Gola rainforest National Park, Kenema, Sierra Leone.

[taniaminhos@fcs.unl.pt](mailto:taniaminhos@fcs.unl.pt)

**Keywords:** Genetic structure, genetic diversity, population connectivity, demographic history

Over 60% of non-human primate species are threatened with extinction as a consequence of human activities such as agriculture, hunting and mining, and the situation is particularly severe in West Africa. The large and well-preserved forests of Gola Rainforest National Park (GRNP), Sierra Leone, are an exception across the highly anthropogenic impacted West African landscapes. Notwithstanding the fact that over 20,000 people live adjacently to the park, the forests of GRNP still harbour a large diversity of species, including several primates. We used non-invasive faecal DNA to unravel the population dynamics of two of the most vulnerable primates in GRNP, the Western red colobus monkey (*Piliocolobus badius badius*) and the king colobus (*Colobus polykomos*). Through the analysis of 146 red colobus and 25 king colobuses across the park we investigated population-level parameters (genetic diversity, spatial structure, demographic history) using a dozen of microsatellite loci. We found both colobus monkeys from GRNP to be continuous populations exhibiting high levels of genetic diversity. The estimated effective population size is higher for red colobus than for King colobuses, but both have experienced a significant population decline at more than 6,000 years ago, showing that forest preservation has been crucial for the maintenance of these populations in its recent past.

### An ethnoprimate study about the bushbabies (Galagidae, Gray 1825) of Guinea-Bissau

Luís Nhaga<sup>1</sup>, Rui Sá<sup>2</sup> & Cecilia Veracini<sup>2</sup>

<sup>1</sup>Dep. Environmental Science, Universidade Lusófona da Guiné-Bissau. <sup>2</sup>Centre for Public Administration and Public Policies (CAPP) – ISCSP, University of Lisbon.

[nhagadanfa@gmail.com](mailto:nhagadanfa@gmail.com)

**Keywords:** West Africa, nocturnal primates, perception, conservation, local communities

The exact distribution of the bushbabies (Family Galagidae) and their conservation status, ecology and behaviour in Guinea-Bissau (West Africa) are still little known. The objectives of this work are: (i) to record information about the bushbabies of Guinea-Bissau and, (ii) to examine the perceptions of and attitudes to these nocturnal primates. An ethnographic approach was used in two study areas: the Oio region in the Center, and Cacheu in the North. We used a questionnaire survey with 25 questions about species identification, attitudes, use and local knowledge (N=100) and complemented this with informal interviews with people from local communities. Preliminary results show that bushbabies are perceived as bad animals in both study areas (82% of respondents) because they feed on the sap of palms (African palm, *Elaeis guineensis*). We found no significant relationship between the two main religions (animistic and Christian) and this perception. Bushbabies are hunted and eaten but apparently not kept as pets. Most (97%) respondents noted that the bushbabies' populations are decreasing and consider hunting and deforestation as the main causes of this phenomenon. These results can be used for future projects in environmental education to enhance the conservation of bushbabies and the forest they depend on.

### Social contagion in captive chimpanzees: presence and modulating factors

Ivan Norscia<sup>1</sup>, Altea Pasqualotto<sup>1</sup>, Giulia Ciarcelluti<sup>1,2</sup>, Elisa Demuru<sup>3,4</sup>, Miquel Llorente<sup>5</sup> & Giada Cordoni<sup>1</sup>

<sup>1</sup>Department of Life Sciences and Systems Biology, University of Torino, Torino, Italy. <sup>2</sup>Research Department, Fundació Mona, Riudellots de la Selva, Girona, Spain. <sup>3</sup>Laboratoire Dynamique Du Langage, University of Lyon, CNRS-UMR5596, Lyon, France. <sup>4</sup>Equipe de Neuro-Ethologie Sensorielle ENES/CRNL, University of Lyon/Saint-Etienne, CNRS-UMR5292, INSERM UMR\_S1028, Saint-Etienne, France. <sup>5</sup>Serra Hünter Fellow, Departament de Psicologia, Universitat de Girona, Girona, Spain.

[Ivan.norscia@unito.it](mailto:Ivan.norscia@unito.it)

**Keywords:** behavioural contagion, mimicry, imitation, non-verbal intersubjectivity, empathy

The contagion of interactive behaviours (social contagion) is an understudied phenomenon related to emotional intersubjectivity and possibly basic empathy abilities. We investigated presence and modulating factors of social contagion in chimpanzees for high order behavioural categories, namely aggression, allogrooming and social play (target behaviours). We extracted 118.5hs of observational data from 1422 videos recorded simultaneously on two captive chimpanzee groups (N=14) living in visual/acoustic contact at Fundació Mona (Girona, Spain). Each time a target behaviour was enacted by a subject (trigger), we recorded which individuals (in-group/out-group) could detect such behaviour or not (detection/control condition), and whether they would enact the same behaviour within 3min (behavioural contagion). We then examined the possible effect of individual factors (age, sex) and social factors (group) on behavioural contagion. All the examined behaviours were contagious, with age having a significant effect on aggression and grooming. Group tended to show an effect on aggression contagion whereas social play did not appear to be affected by any of the considered individual and social factors. As chimpanzees are our closest living relatives, this study opens the way to a better understanding of the evolution of implicit emotional intersubjectivity in humans.

## Abnormal repetitive behaviours and risk factors in *Lemur catta*

Dmitry Ocunski<sup>1</sup>, Miquel Llorente<sup>1,2</sup> & Gloria Fernández-Lázaro<sup>3,4</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, Girona, Spain. <sup>2</sup>Serra Húnter Fellow, Grup de Recerca “Llenguatge i Cognició”, Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Girona, Spain. <sup>3</sup>Departamento de Psicología Biológica y de la Salud, Facultad de Psicología, Universidad Autónoma de Madrid, Madrid, Spain. <sup>4</sup>Departamento de Didáctica de las Ciencias Experimentales, Sociales y Matemáticas, Facultad de Educación, Universidad Complutense de Madrid, Madrid, Spain.

[dmitry0@hotmail.com](mailto:dmitry0@hotmail.com)

**Keywords:** Abnormal repetitive behaviours, stereotypic behaviour, ring-tailed lemur, animal welfare

Captive animals can display abnormal repetitive behaviours (ARB), rarely seen in the wild, which have been identified as signs of poor welfare. For non-human primates, different species housed at laboratories or zoos presented them, however the information on strepsirrhines is scarce. In this study we analysed risk factors associated with ARB in a sample of 12 *Lemur catta* in managed care. Multifocal all-occurrences of ARB and the context in which they occurred were collected during one-hour sessions throughout the day, in outdoor and indoor enclosures, for a total of 75 hours. Using veterinary records, we assessed if health problems and/or clinical interventions could be related with ARB presence. The most prevalent ARB found was neck-twists, and its presence increased during the entrance/exit of the indoor/outdoor enclosures. We found a significant positive correlation between ARB and the degree of proximity to other individuals ( $p < .001$ ), probably because it implies a context of greatest social stress. Other variables, such as sex, age, rank, time dedicated to grooming, clinical history and human presence, did not show any significant relationship. Studies under different conditions and with a larger sample are necessary to establish a clear relationship between predictor variables and ARB in lemurs.

## Social compatibility in an all-male group of captive chimpanzees (*Pan troglodytes*)

Ester Orient & Federico Guillén-Salazar

*Ethology and Animal Welfare Section, Universidad Cardenal Herrera-CEU, CEU Universities, Valencia, Spain.*

[esther.orient@uchceu.es](mailto:esther.orient@uchceu.es)

**Keywords:** Chimpanzees, social network analysis, all-male groups, social compatibility, surplus males.

Chimpanzees (*Pan troglodytes*) have been categorized as “endangered” by the IUCN and measures to promote their conservation have increased during the last decades. The European strategy was based on the creation of breeding units with a single male, which in combination with a 1:1 sex ratio of newborns, has led to a surplus of males. Despite the complex social organization of chimpanzees, the formation of all-male groups is a strategy contemplated by some primate managers. Here, we present the results of a study in which we evaluated the social compatibility of an all-male group of chimpanzees using social network analysis. The study was conducted at the Fundació Mona (Spain). Data on social behaviour were collected during 2 periods of 12 days: P1, June 2014 and P2, March 2015. Within each period, data were obtained from Monday to Friday, 3 h per day, 36 h per period. Our results show the study group is socially compatible. Males showed high levels of affiliative behaviours and low levels of aggressive behaviours. Moreover, these

results remained stable. Similarly, the most central individuals in both networks were identified and they also remained stable. Therefore, all-male groups could be a potential option for the surplus males.

## Are human attitudes on the way to a sustainable coexistence with sympatric nonhuman primates? A systematic review

Ana Ostos-Ruano <sup>1,2</sup>, Jaume Fatjó <sup>3</sup> & Montserrat Franquesa-Soler <sup>2,4</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, CP 17003, Girona, Spain. <sup>2</sup>Miku Conservación AC, CP 91056, Xalapa, Veracruz, México. <sup>3</sup>Cátedra Fundación Affinity Animales y Salud, Departamento de Psiquiatría y Medicina Legal, Universidad Autónoma de Barcelona, CP 08193, Barcelona, Spain. <sup>4</sup>Universidad Popular Autónoma del Estado de Puebla, CP 72410, Puebla, México.

[anaostos7@hotmail.com](mailto:anaostos7@hotmail.com)

**Keywords:** primates, coexistence, ethnoprimateology, attitude, qualitative methodology

Our interactions with nonhuman primates where we cohabit are increasing and being modified by new realities as the ecological niches overlap. Ethnoprimateological research focused on these interconnections has increased significantly in recent years, trying to elucidate a complex interface. In this review, PRISMA statement was used as a formal systematic guideline for data collection. We obtained data from research studies over the period 2007-2022 focused on articles that have acquired human perceptions, beliefs, emotions, and behaviours towards nonhuman primates through qualitative methodology. The analysis included a total of 94 articles from Web of Science and Google Scholar databases. We aimed to know the predominant human attitudes with their contexts and significant variables together with the scientific approach in this field. As a preliminary stage of analysis, we found a trend towards positive perceptions and the main topics on crop-forage (38%), hunting (19%), and consumption (15.2%). The predominant frame of research was on human–nonhuman primate conflict (47.5%), while sustainable coexistence (6%) has modest presence in scientific literature. Future research considering this bias and a consensus in the term of ‘coexistence’ is needed to further understand the conflict-to-sustainable coexistence continuum and to aid planning for conservation policies in areas of sympatry.

## Eysenck’s personality model in captive chimpanzees: assessment of a larger sample

Maria Padrell<sup>1,2</sup>, Federica Amici<sup>3,4</sup> & Miquel Llorente<sup>1</sup>

<sup>1</sup>Departament de Psicologia, Facultat d’Educació i Psicologia, Universitat de Girona, 17004 Girona, Spain. <sup>2</sup>Research Department, Fundació Mona, 17457 Girona, Spain. <sup>3</sup>Max Planck Institute for Evolutionary Anthropology, Department of Comparative Cultural Psychology, D-04103 Leipzig, Germany. <sup>4</sup>University of Leipzig Faculty of Life Science, Institute of Biology, D-04103 Leipzig, Germany.

[mariapadrell@gmail.com](mailto:mariapadrell@gmail.com)

**Keywords:** chimpanzees, Eysenck, PEN model, personality, questionnaires

It has been extensively demonstrated that questionnaires adapted from human models can be reliable measures of non-human primates’ personality. In this study, we used an adaptation of Eysenck’s Psychoticism-Extraversion-Neuroticism (PEN) model, a psychobiological theory of personality that focuses on three higher-order traits. Our aim was to replicate and extend a previous study by assessing a larger and more diverse sample of chimpanzees (*Pan troglodytes*). We predicted that our results would confirm

the suitability of the PEN model to assess personality in this species. Subjects were 37 chimpanzees housed at Fundació Mona (Girona, Spain) and Leipzig Zoo (Germany). Personality was assessed using a 12-item questionnaire which rates scored using a 7-point Likert scale. To identify the personality traits we conducted data reduction with Principal Components Analysis and Robust Unweighted Least Squares. The ICCs for the single (3, 1) and average (3, k) ratings were high, indicating good reliability. Parallel analyses identified 2 factors to retain, whereas the scree plot, eigenvalues and factor analyses identified 3 factors. These three factors were highly similar to the ones described in the previous study (namely, Extraversion, Neuropsychoticism and Dominance/Submission), thus confirming the potential of the PEN model to describe chimpanzee personality structure.

### **Cognitive enrichment in socially-housed chimpanzees: behavioural and welfare outcomes of a novel tool-based device**

Maria Padrell<sup>1,2</sup>, Federica Amici<sup>3,4</sup>, Maria Pau Córdoba<sup>2</sup> & Miquel Llorente<sup>1</sup>

<sup>1</sup>*Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, 17004 Girona, Spain.* <sup>2</sup>*Research Department, Fundació Mona, 17457 Girona, Spain.* <sup>3</sup>*Max Planck Institute for Evolutionary Anthropology, Department of Comparative Cultural Psychology, D-04103 Leipzig, Germany.* <sup>4</sup>*University of Leipzig Faculty of Life Science, Institute of Biology, D-04103 Leipzig, Germany.*

[mariapadrell@gmail.com](mailto:mariapadrell@gmail.com)

**Keywords:** behaviour, chimpanzees, cognitive enrichment, tool-use, welfare

Foraging devices constitute an effective enrichment strategy for non-human primates, providing both cognitive and manipulative stimulation. In this study, we assessed the behavioural effects of a novel tool-based enrichment in 14 chimpanzees (*Pan troglodytes*) housed at Fundació Mona (Girona, Spain). We hypothesized that the enrichment would have a positive effect on chimpanzees' welfare by promoting species-typical behaviours and reducing negative ones, while also affecting social interactions. The device consisted of a double-sided vertical maze filled with food rewards. We conducted behavioural observations in two conditions over a 2.5-month period: when the food maze was loaded (12 enrichment days) and when it was empty (12 baseline days). Data were collected using 2-min scan sampling and untimed-event focal sampling. We found that participation widely varied among subjects, being higher in females and decreasing through time. Furthermore, participation was linked to an increase in tool use and manipulation and a decrease in inactivity, but also to an increase in aggression-related and self-directed behaviours. In contrast, participation had no effect on abnormal behaviours, social proximity or affiliation-related behaviours. We conclude that these types of devices should be evaluated during longer periods and that greater consideration must be given to individual preferences and abilities.

### **Alterations of group composition in former pet and entertainment chimpanzees: impact on behaviour and social network**

Arnau Pascual<sup>1</sup>, Dietmar Crailsheim<sup>2</sup>, Elfriede Kalcher-Sommersguter<sup>3</sup> & David Riba<sup>2,4</sup>

<sup>1</sup>*Fundació UdG: Innovació i Formació, Universitat de Girona, Girona, Spain.* <sup>2</sup>*Research Department, Fundació MONA, Riudellots de la Selva, Spain.* <sup>3</sup>*Institute of Biology, University of Graz, Graz, Austria.* <sup>4</sup>*Facultat de Lletres, Universitat de Girona, 17003 Girona, Spain.*

[arnaupascual6@gmail.com](mailto:arnaupascual6@gmail.com)

**Keywords:** Chimpanzees, integration, social network analysis, behaviour, group alterations

Chimpanzees (*Pan troglodytes*) are highly social animals, living in flexible fission-fusion societies with frequent changes in both group size and composition. These changes depend mostly on habitat's resource availability but can also be influenced by individual social preferences. In this study, we observed a group of seven chimpanzees at Fundació MONA, which went through several group alterations. The objective of this study was to analyse how these alterations might affect the chimpanzees' general activity level, the occurrence of abnormal and self-directed behaviours and their social grooming networks. We conducted instantaneous scan sampling in 2-minute intervals to collect behavioural data over a 7-year period. We conducted LMMs to assess the significance of group size, sex composition, seasonality, the individuals' sex and origin (wild caught vs. captive born). The chimpanzees were more active yet exhibited more abnormal and self-directed behaviours while the group was all-male. Furthermore, group size was positively correlated with activity levels. Seasonality did influence the activity level and time spent grooming. Females spent more time grooming while the individual's origin had an impact on most behavioural outcomes. Thus, we conclude that comparisons between different groups or evaluations over time should consider the above-mentioned predictors and be interpreted with caution.

### **Preliminary results on the genetic diversity and population connectivity of Guinea baboons' desert populations in Mauritania**

Cristian Pizzigalli<sup>1,2</sup>, Maria Joana Ferreira da Silva<sup>1,3</sup>, Andack Saad Sow<sup>4</sup>, Hamidou Dieng<sup>4</sup>, Raquel Godinho<sup>1,2</sup>, Orly Razgour<sup>5</sup> & José Carlos Brito<sup>1,2</sup>

<sup>1</sup>CIBIO/InBIO, Research Center in Biodiversity and Genetic Resources, Rua Padre Armando Quintas, 4485-661 Vairão, Portugal. <sup>2</sup>Department of Biology, Faculty of Sciences, University of Porto, Rua do Campo Alegre, 4169-007 Porto, Portugal. <sup>3</sup>Organisms and Environment Division, School of Biosciences, Cardiff University, Cardiff, Wales, United Kingdom. <sup>4</sup>Department of Biology, University of Nouakchott. <sup>5</sup>University of Exeter, Prince of Wales Road, Exeter, EX4 4PS, UK.

[pizzigalli.cristian@cibio.up.pt](mailto:pizzigalli.cristian@cibio.up.pt)

**Keywords:** non-invasive sampling, conservation, Sahara-Sahel, Anthropocene, connectivity

The Guinea Baboon (*Papio papio*) is a Near Threatened species endemic to West Africa. Although locally common along its distribution, during the last 30 years human activity has strongly affected its persistence. Research efforts on this species are mostly restricted to the central and southern areas of its geographic range, leaving a huge gap in knowledge on the northernmost populations. This data deficiency is particularly relevant in Mauritanian desert wetlands, where resources are temporary variables, and Guinea baboons survive under extreme environmental conditions. In four field surveys implemented in Mauritania from 2016 to 2022, we discovered 47 new localities distributed in the Tagant, Assaba, and Afollé mountains as well as along the borders with Mali and Senegal. During our expeditions, we collected more than 600 non-invasive genetic samples and direct observations. Preliminary genetic analyses of the mitochondrial DNA show very high levels of haplotype diversity (ranging between 0,954 and 0,836), and connectivity between the populations living in the southern Assaba, Afollé, and Senegal River. Additionally, the populations inhabiting the northern Assaba and Tagant plateau are show the lowest levels of haplotype diversity (0,836), being in contact just with the populations inhabiting the southern Assaba region.

## Quantitative analysis of rotator cuff muscles in non-hominoid primates

J.M. Potau<sup>1,2</sup>, A. Casado<sup>1,2,3</sup>, M. García<sup>1,3</sup>, R. Cabo<sup>4</sup> & J.F. Pastor<sup>5</sup>

<sup>1</sup>Unit of Human Anatomy and Embryology, University of Barcelona, Spain. <sup>2</sup>Institut d'Arqueologia de la Universitat de Barcelona, University of Barcelona, Spain. <sup>3</sup>Department of Evolutionary Biology, Ecology and Environmental Sciences, University of Barcelona, Spain. <sup>4</sup>Department of Morphology and Cell Biology, University of Oviedo, Spain. <sup>5</sup>Department of Anatomy and Radiology, University of Valladolid, Spain.

[jpotaub@ub.edu](mailto:jpotaub@ub.edu)

**Keywords:** rotator cuff, non-hominoid primates, locomotion

In the present study we have analyzed the proportion of the mass of the rotator cuff muscles in different species of non-hominoid primates. The rotator cuff is considered the main stabilizing structure of the glenohumeral joint and is formed by the subscapularis, supraspinatus, infraspinatus and teres minor muscles. Our objective is to find differences that can be related from a functional point of view with the different types of locomotion that the analysed primate species present. We hypothesize that the importance of the medial rotation movement of the glenohumeral joint in arboreal-type locomotion will translate into a greater proportion of the mass of the muscle involved in this movement (subscapularis) in primates that present this type of locomotion. To test this hypothesis, the rotator cuff muscles have been dissected in 51 non-hominoid primates, which have been grouped into four groups according to their type of locomotion: arboreal quadrupeds, semiterrestrial quadrupeds, vertical clingers and terrestrial quadrupeds. The results obtained indicate that non-hominoid primates that perform some type of arboreal-type locomotion have a relatively larger subscapularis muscle than strictly terrestrial primates, while the latter have a greater proportion of the mass of the lateral rotator muscles of the glenohumeral joint. The study was approved by the Ethics Committee of the University of Barcelona (IRB 00003099).

## Phylogenetic study of the features of semicircular canals in Homininae subfamily using micro CT images and 3D virtual models

Amara Quirós-Sánchez<sup>1</sup>, Ignacio Martínez Mendizábal<sup>1,2</sup>, Ángeles Sánchez-Andrés<sup>2</sup> & Mercedes Conde-Valverde<sup>1,2,3</sup>

<sup>1</sup>Universidad de Alcalá, Cátedra de Otoacústica Evolutiva y Paleoantropología (HM Hospitales-Universidad de Alcalá), Departamento de Ciencias de la Vida, 28871 Alcalá de Henares, Madrid, Spain. <sup>2</sup>Universidad de Alcalá, Cátedra Francisco Javier Muñiz para el Estudio de la Evolución Humana (Universidad de Buenos Aires – Universidad de Alcalá). Departamento de Ciencias de la Vida, 28871 Alcalá de Henares, Madrid, Spain. <sup>3</sup>Department of Anthropology, Binghamton University (SUNY), Binghamton, NY 13902-6000, USA.

[amaraqs@gmail.com](mailto:amaraqs@gmail.com)

**Keywords:** Homininae, semicircular canals, evolution, phylogeny, cercopithecidae

Micro computed tomography (mCT) enables accurate biometric studies of the bony labyrinth by creating three-dimensional (3D) models in primate temporal bones (very useful for phylogenetic analyses). In our investigation we performed a comparative morphometric analysis of the semicircular canals (SCC) in three samples: *Gorilla gorilla* (N=23), *Pan troglodytes* (N=11) and *Homo sapiens* (N=26). Our objective is to establish a hypothesis of the sequence of evolutionary changes experienced by the SCC, in terms of their relative size and shape, in Homininae subfamily. To define the polarity states of the features (ancestral or derived) we use the outgroup method, which consists of obtaining measures from the SCC of another



species of primates related to our study samples and comparing them. We use as an outgroup the SCC measures of individuals of the Hominidae family (*Pongo pygmaeus* and *Hylobates syndactylus*) and the Cercopithecidae family (*Macaca fascicularis* and *Mandrillus sphinx*). Statistical results show significant differences between several characters in the SCC of the three samples studied, so it is possible to set up a sequence of evolutionary changes. Conclusion: we observed one derived trait in the SCC of Hominidae family, two in the *G. gorilla* species, one in *P. troglodytes* and five in *H. sapiens*.

## Leprosy in wild chimpanzees in Cantanhez National Park, Guinea-Bissau

Marina Ramon<sup>1,2</sup>, Harriet R Herridge<sup>1,3,4</sup>, Livia V Patrono<sup>3</sup>, Elena Bersacola<sup>1,5</sup>, Joana Bessa<sup>5,6</sup>, Américo Sanhá<sup>7</sup>, Maimuna Jaló<sup>7</sup>, Alexandra J D Dell<sup>1,3,4</sup>, Isa Aleixo-Pais<sup>2,5</sup>, Camille Bonneaud<sup>1</sup>, Sébastien Calvignac-Spencer<sup>4</sup>, Fabian H. Leendertz<sup>3</sup>, Michael W Bruford<sup>2</sup> & Kimberley J Hockings<sup>1</sup>

<sup>1</sup>Centre for Ecology and Conservation, College of Life and Environmental Sciences, University of Exeter, Penryn, United Kingdom. <sup>2</sup>School of Biosciences, Cardiff University, Cardiff, United Kingdom. <sup>3</sup>Helmholtz Institut für One Health, Universitätsmedizin Greifswald, Greifswald, Germany. <sup>4</sup>Project Group Epidemiology of Highly Pathogenic Microorganisms, Robert Koch Institute, Berlin, Germany. <sup>5</sup>Centre for Research in Anthropology (CRIA – FCSH/ NOVA), Lisbon, Portugal. <sup>6</sup>Department of Zoology, University of Oxford, Oxford, United Kingdom. <sup>7</sup>Instituto da Biodiversidade e das Áreas Protegidas (IBAP), Bissau, Guinea-Bissau.

[mr637@exeter.ac.uk](mailto:mr637@exeter.ac.uk)

**Keywords:** Hansen's disease, infectious diseases, *Mycobacterium leprae*, *Pan troglodytes verus*, non-invasive health monitoring

Leprosy is a chronic infectious disease mainly caused by the bacterial pathogen *Mycobacterium leprae*. The disease was first reported in wild non-human primates in a population of unhabituated western chimpanzees (*Pan troglodytes verus*) in Cantanhez National Park (CNP), Guinea-Bissau. Camera trap monitoring between 2015 and 2019 provided 241 independent events (5.6% of the total) comprising chimpanzees with severe leprosy-like lesions, including four clearly identifiable individuals (two adult males and two adult females) across three communities. Longitudinal observations showed progression of symptoms with manifestations similar to those described in humans. To estimate leprosy prevalence in one of these communities, 237 chimpanzee faecal samples were non-invasively collected in Caiquene-Cadique between May and July 2021. Each sample was screened for *M. leprae* DNA using two nested PCR systems targeting the repetitive element RLEP and the 18-kDa antigen gene. Evidence of infection was observed in eight samples in both assays. Chimpanzee DNA was amplified at 12 autosomal microsatellite loci and one sexing marker to infer the number and sex of the individuals. This research shows the usefulness of combining non-invasive methods to conduct health monitoring on unhabituated great apes and provides critical knowledge to inform an effective leprosy management plan in CNP.

## Social rank explains tooth wear in female Amboseli baboons

Morena Rodríguez<sup>1</sup>, Andrea Velasco<sup>2</sup>, Elizabeth A. Archie<sup>3</sup>, Jenny Tung<sup>4,5,6</sup>, Susan C. Alberts<sup>4,5</sup> & Jordi Galbany<sup>1,7</sup>

<sup>1</sup>Dept of Clinical Psychology and Psychobiology, Faculty of Psychology, University of Barcelona, 08035 Barcelona, Spain. <sup>2</sup>Fundació UdG: Innovació i Formació, University of Girona, 17003 Girona, Spain.

<sup>3</sup>Department of Biological Sciences, University of Notre Dame, Notre Dame, IN 46556, USA. <sup>4</sup>Dept of Evolutionary Anthropology, Duke University, Durham, NC 27708, USA. <sup>5</sup>Dept of Biology, Duke University, Durham, NC 27708, USA. <sup>6</sup>Dept of Primate Behaviour and Evolution, Max Planck Institute for Evolutionary Anthropology, 04229 Leipzig, Germany. <sup>7</sup>Institute of Neurosciences, University of Barcelona. 08035 Barcelona, Spain.

[mrodriro185@alumnes.ub.edu](mailto:mrodriro185@alumnes.ub.edu)

**Keywords:** dentine exposure, aging, social rank, feeding ecology, *Papio cynocephalus*

Tooth wear in primates is caused by aging and ecological factors, but there are other environmental variables that may affect it as well. We analysed mandibular and maxillary tooth replicas from 126 female baboons and quantified the tooth wear for each molar as the percent of dentine exposure (PDE). We examined the relationship between PDE of the first molar in relation to age, sex, social and life history variables, and ecological variation. Specifically, we used a GLM with gamma distribution and logarithmic link function (Jamovi 2.2.5) to test whether tooth wear is predicted by female age, social rank, feeding time spent consuming grass corms, drought days and total rainfall experienced after age 25 months, number of days pregnant, and number of days with a dependent infant. In addition to the expected effects of age, we found that low social rank and increased corm feeding significantly predicted higher tooth wear (R-squared of the model = 0.751). We did not find an effects of maternal investment, drought, or rainfall on tooth wear. Nevertheless, this is the first study to reveal that the costs of low rank in female baboons may extend to accelerated rates of dental wear.

### Patterns of variation in dental morphometrics among *Pan* species

Alejandro Romero<sup>1</sup>, Stéphanie Torrijo-Boix<sup>1</sup>, Alejandro Pérez-Pérez<sup>2</sup> & Jordi Galbany<sup>3,4</sup>

<sup>1</sup>Departamento de Biotecnología, Universidad de Alicante, Alicante, Spain. <sup>2</sup>Departament de Biologia Evolutiva, Ecologia i Ciències Ambientals, Universitat de Barcelona, Barcelona, Spain. <sup>3</sup>Departament de Psicologia Clínica i Psicobiologia, Universitat de Barcelona, Barcelona, Spain. <sup>4</sup>Institut de Neurciències. Universitat de Barcelona, Barcelona, Spain.

[arr@gcloud.ua.es](mailto:arr@gcloud.ua.es)

**Keywords:** geometric morphometrics, tooth, ecology, divergence, great apes

Dental phenograms are closely related to genetic mappings within *Pan* species suggesting that tooth morphometrics is an effective proxy for biological distances. However, little is known about ecogeographic factors affecting interspecific molar shape variability. We used three-dimensional (3D) geometric morphometrics to compare shape and size patterns of the lower first permanent molars (M1s) between eastern chimpanzees (*Pan troglodytes schweinfurthii*,  $n=36$ ) and bonobos (*Pan paniscus*,  $n=34$ ) of known geospatial origin from Democratic Republic of the Congo. Analyses were limited to infant individuals with no dentine exposure. Meshes were generated from high-resolution polyurethane tooth crown replicas using a structured-light 3D scanner. Occlusal surface shape and size models were extracted from a landmark configuration through Generalized Procrustes Analysis using the 3D Slicer platform. Principal Component and regression analyses were used to determine the between-species differences in morphometrics and covariations with individual geographic location. Results show significant different dental shape and size trajectories between species. Chimpanzees exhibit lingually elongated larger teeth than those of bonobos, which displayed smaller shapes and shorter between-cusps distances. We also found larger amount of dental-shape variation in chimpanzees with increasing latitude. Our findings indicate that ecological constraints influence intra-taxon dental phenetic variability to be explored in greater detail.

## Chimpanzee (*Pan troglodytes verus*) Army Ant (*Dorylus* spp.) foraging: A new study from Dindefelo, Senegal

Andreu Sánchez-Megías<sup>1,2</sup>, Carlota F. Galán-Plana<sup>2</sup>, Nadia Mirghani<sup>2</sup>, Laia Dotras<sup>1,2</sup>, Jordi Galbany<sup>2,3,4</sup>, Manuel Llana<sup>2</sup>, Adrián Arroyo<sup>5,6</sup>, Justinn Renelies-Hamilton<sup>2</sup> & R. Adriana Hernandez-Aguilar<sup>1,2,7</sup>

<sup>1</sup>Department of Social Psychology and Quantitative Psychology, Faculty of Psychology, University of Barcelona, Barcelona, Spain. <sup>2</sup>Jane Goodall Institute Spain and Senegal, Dindefelo Biological Station, Dindefelo, Kedougou, Senegal. <sup>3</sup>Department of Clinical Psychology and Psychobiology, Faculty of Psychology, University of Barcelona, Barcelona, Spain. <sup>4</sup>Institute of Neurosciences, University of Barcelona, Barcelona, Spain. <sup>5</sup>Institut Català de Paleoecologia Humana i Evolució Social (IPHES), Tarragona, Spain. <sup>6</sup>University Rovira i Virgili (URV), Prehistory Section, Tarragona, Spain. <sup>7</sup>Serra Hunter Programme, Generalitat de Catalunya, Spain.

[andreu.sanchez.megias@gmail.com](mailto:andreu.sanchez.megias@gmail.com)

**Keywords:** insectivory, tool set, composite tool, culture, primate

Army ant (*Dorylus* spp.) foraging by chimpanzees (*Pan troglodytes verus*) occurs across Africa and shows extensive variation among study sites. Dipping for army ants with stick tools, ant dipping, is the most common strategy to obtain these insects. Here we present the first study of ant dipping by savanna chimpanzees at Dindefelo, Senegal. Between 2018-2022, we examined nine ant dipping activity sites where we collected 151 tools and obtained camera trap recordings. We investigated tool material selectivity by plant species, growth form and distance of the plant source to the army ant nest. Dindefelo chimpanzees favoured lianas and used plant species for tool manufacture regardless of their availability and plant source distance to the army ant nest. The chimpanzees employed composite tools (bended branches from where they ant dipped). In addition, we found indirect evidence of tool set use, which included digging tools (wider and with different modifications, but not longer than ant dipping tools). Furthermore, our video analysis suggests that Dindefelo chimpanzees relayed on their sight, smell and taste to detect army ants. Our study contributes to our understanding of the behavioural diversity of chimpanzee army ant foraging, including new reports on tool material selectivity and ant detection strategies.

## Manual laterality in coordinated bimanual tasks in non-human primates: A systematic review and meta-analysis

Cristina Soto<sup>1</sup>, José M.M. Gázquez<sup>1</sup> & Miquel Llorente<sup>1,2</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, Carrer Pic de Peguera 11, 17003 Girona, Spain. <sup>2</sup>Serra Húnter Fellow, Grup de Recerca "Llenguatge i Cognició", Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Plaça Sant Domènec 9, 17004 Girona, Spain.

[cristina.soto.sanchz@gmail.com](mailto:cristina.soto.sanchz@gmail.com)

**Keywords:** Hand-preference, laterality, meta-analysis, non-human primates, tube task, bimanual tasks

Hand preferences among non-human primates has been studied for decades. Manual laterality at both individual and population-level is relevant due to its evolutionary significance and link to the emergence of gestural communication and language. In this study, we conducted a meta-analysis to integrate data on hand preferences in non-human primates performing the tube task and other bimanual tasks to determine the presence and direction of manual laterality at individual and population level. We followed the guidelines

described in the PRISMA 2020 statement to select, appraise, synthesise, and identify studies. We found a significant individual-level lateralization for these bimanual tasks. In non-human primates, 81% of the individuals showed right or left-hand preference performing the tube task, these figures being 88% for other bimanual tasks. No asymmetry was found at population level, unlike in humans. Additionally, no preference in direction was found in either of the tasks, although a strong manual preference was found for both types of bimanual tasks evaluated. Species was studied as a moderator variable throughout the meta-analysis. These results emphasize the importance of standardized testing methodologies across species and institutions to obtain comparable data and fill the gaps in the taxonomy.

### **Analysis of the relation between dominance rank and proximity in brown capuchin monkeys (*Sapajus apella*) at the Zoo Aquarium of Madrid**

Andra Paula Sticea Covaciu, Manuel José Esparza Baños, Sergio Díaz Gonzalez & Ana Fidalgo de las Heras

*Facultad Psicología, UAM.*

[andrapaula2000@gmail.com](mailto:andrapaula2000@gmail.com)

**Keywords:** Capuchin monkeys, hierarchy, proximity, network analysis, *Sapajus apella*

Several studies with different primate species show a relationship between spatial proximity and hierarchy, among other factors. In order to clarify the demographic patterns of social organization that characterize the *Sapajus apella* species, the present study explores the relationship between dominance rank and proximity in the 8 individuals that form the Zoo Aquarium's capuchin monkey group. It is expected a central position for the dominant individuals and a peripheral position for the dominated individuals as a result of rejection towards the dominant individuals. For this purpose, social network analysis was applied, as well as cluster analysis. The results indicate a significant relationship between the social status of the individual and its position in the network ( $R=-0.8546$ ,  $p=0.014$ ), with lower-ranking having the lowest centrality in the proximity network. These results, in addition to extending the literature on primates, could be very useful for future lines of research, deepening the knowledge of these mammals in order to raise animal welfare standards.

### **Creating a microclimate for marmosets and tamarins: The example of the Darwin Foundation**

Montserrat Ubach-Tarrés<sup>1</sup> & Cecilia Veracini<sup>1,2</sup>

<sup>1</sup>Darwin Foundation. <sup>2</sup>Centre for Public Administration and Public Policies (CAPP) – ISCSP, University of Lisbon.

[darwin@darwin.cat](mailto:darwin@darwin.cat)

**Keywords:** Callitrichids, sanctuaries, urban environment, environmental enrichment

Keeping marmosets and tamarins in facilities far from their natural habitat requires the creation of climate conditions that ensures their natural behaviour and a high quality of life. The Darwin Foundation, in its rescue centre in Barcelona, instead of keeping the animals indoors has used a different methodology: it was created an outdoor microclimate, a rich habitat with different species of plants (using containers such as flowerpots and planters) with a closed water circuit system to maintain the humidity of the environment.

It acts as a green lung and helps to regulate environmental impacts, such as air and noise pollution, while mitigating the negative effects of wind, cold and high temperatures. 30 different plant species were planted in a period of 20 years and the results of this process show that this space behind providing an important environmental enrichment for the primates, directly provides them some food (e.g. *Eriobotrya japonica* fruits). The biodiversity of the microclimate attracts various species of birds (e.g. *Erithacus rubecula*, *Carduelis chloris*), small vertebrates and invertebrates that can also be eaten by primates. Currently, the 22 callithrichids hosted in the sanctuary can spend most of their time outdoor with obvious health and behavioural benefits.

### Emotional contagion in wild spider monkeys (*Ateles geoffroyi*)

Sara Valdivieso<sup>1</sup>, Chiara Bernardi<sup>1</sup>, Miquel Llorente<sup>1,2,3</sup>, Filippo Aureli<sup>4,5,6</sup> & Federica Amici<sup>7,8</sup>

<sup>1</sup>Fundació UdG: Innovació i Formació, Universitat de Girona, 17003 Girona, Spain. <sup>2</sup>Serra Húnter Fellow, Grup de Recerca “Llenguatge i Cognició”, Departament de Psicologia, Facultat d'Educació i Psicologia, Universitat de Girona, Girona, Spain. <sup>3</sup>Institut de Recerca i Estudis en Primatologia, IPRIM, 17246 Santa Cristina d'Aro, Spain. <sup>4</sup>Instituto de Neuroetología, Universidad Veracruzana, 91190, Xalapa, Mexico. <sup>5</sup>ConMonoMaya A.C., 97770, Chemax, Mexico. <sup>6</sup>School of Biological and Environmental Sciences, Faculty of Science, Liverpool John Moores University, Liverpool, UK. <sup>7</sup>Department of Comparative Cultural Psychology, Max Planck Institute for Evolutionary Anthropology, 04103, Leipzig, Germany. <sup>8</sup>Faculty of Life Sciences, Institute of Biology, University of Leipzig, 04103, Leipzig, Germany.

[sara.valcor.35@gmail.com](mailto:sara.valcor.35@gmail.com)

**Keywords:** emotional contagion, empathy, yawning, scratching, spider monkeys

Emotional contagion is a mechanism by which individuals automatically synchronize their physiological and behavioural states with those of others to promote the same emotional state. In humans, yawn contagion has been related to our capacity for empathy, but it is presently unclear whether this capacity is shared with other primates, especially monkeys. Moreover, scratching is an indicator of anxiety in a variety of nonhuman primate species, but it is yet unclear whether it can also be 'contagious' and spread across individuals. Here, we investigated contagiousness patterns of yawning and scratching in 49 individuals of spider monkeys (*Ateles geoffroyi*) from the Otoch Ma'ax Yetel Kooch protected area in the Yucatan peninsula (Mexico). We tested whether individuals observing others yawning or scratching would be more likely to yawn or scratch back than individuals who did not observe others doing that. We ran generalized linear mixed models using a Bayesian approach, and found that the probability of yawning and scratching back was higher after observing another individual yawning/scratching. These findings are consistent with the view that contagious yawning reveals an emotional connection between individuals and might be a building block for empathy, and further suggests that scratching might also be contagious.

### Ecological and cultural aspects of the human – nonhuman primate interface in the island of Santiago (Cape Verde)

Cecilia Veracini

Centre for Public Administration and Public Policies (CAPP) – ISCSP, University of Lisbon.

[cveracini2011@gmail.com](mailto:cveracini2011@gmail.com)

**Keywords:** *Chlorocebus sabaues*, ethnoprimateology, human-wildlife conflicts, biodiversity

This paper aims to discuss the interaction between humans and the green monkey (*Chlorocebus sabaëus*) introduced in Cape Verde since the 16<sup>th</sup> century. Due to the importance of Cape Verde as entrepot for the Atlantic trade, multiple introductions probably took place. Currently, wild populations of green monkeys are found in Santiago and Brava Islands. The relationships between these animals -considered crop raiders- and local people has been somewhat negative, but it seems to have got worse in the last decade. A research was carried on in April and May 2022 in Santiago to understand i) the type of interaction between humans and monkeys; ii) the ecological role of *C. sabaëus*. Interviews were conducted with farmers, forest rangers, workers of local communities and field guides, and data about diet and distribution of *C. sabaëus* were collected. The issue of monkeys' raids is reported by all interviewees and by local authorities. Almost all point to the prolonged dryness of recent years as one of the main causes. As a consequence, monkeys are killed, eaten or captured to be sold as pets for a considerable profit. Preliminary data about ecology show that the green monkeys have an important role in the Santiago biodiversity.

## Authors

- Abelló, Maria Teresa, 20, 30, 41  
Alberts, Susan C, 57  
Albiach-Serrano, Anna, 19  
Aleixo-Pais, Isa, 19, 25, 29, 50, 57  
Alonso, Josep Maria, 20, 30, 41  
Álvarez Solas, Sara, 20  
Amezcuva-Valmala, Nerea, 21, 22  
Amici, Federica, 19, 24, 39, 53, 54, 61  
Archie, Elizabeth A, 57  
Armisen, Suani, 43, 48  
Arroyo, Adrián, 45, 59  
Aureli, Filippo, 24, 61  
Avià, Yasmina, 22, 37  
Ayuso, Pablo R, 34  
Ballesta, Sébastien, 32  
Barca, Benjamim, 19, 50  
Barciela, Amanda, 27, 33, 46  
Batista Ramírez, M<sup>a</sup> Nazaret, 23  
Beltran, Francesc S, 32, 47  
Benedicto Rodríguez, Gema, 23  
Bernardi, Chiara, 24, 61  
Bersacola, Elena, 57  
Bessa, Joana, 57  
Bissiato, Veronica, 30  
Bonneaud, Camille, 57  
Borges, Filipa, 19, 25, 29, 50  
Bortolato, Tatiana, 26  
Brindle, Matilda, 17  
Brito, José Carlos, 55  
Bruford, Michael W, 19, 25, 29, 34, 57  
Bubba, Umaru, 42  
Cabo, Roberto, 22, 37, 56  
Calvignac-Spencer, Sébastien, 57  
Camara, IT, 19  
Camará, Mariato, 34  
Cano-Fernández, Hugo, 23, 26, 42  
Cardoso, Sara, 27  
Carvalho, Susana, 15  
Casado, Aroa, 22, 37, 56  
Casanova, Catarina, 21, 22, 27, 28  
Caso Parajon, Pablo, 31  
Cassama, M, 19  
Castellano-Navarro, Alba, 19  
Castells, Sandra, 30, 41  
Chikhi, Lounès, 25  
Ciarcelluti, Giulia, 30, 51  
Colell, Montserrat, 15  
Colmenares, Fernando, 21, 22  
Colmonero-Costeira, Ivo, 29  
Conde-Valverde, Mercedes, 56  
Corcione, Fabiana P, 29  
Córdoba, Maria Pau, 54  
Cordoni, Giada, 30, 51  
Corradini, Gloria, 20

- Corral, Eva, 30, 41  
Costa, Susana, 29  
Crailsheim, Dietmar, 34, 40, 49, 54  
Crockford, Catherine, 26  
Cuesta-Torralvo, Elisabeth, 22, 37  
de Paz, Félix, 22, 37  
Dell, Alexandra JD, 57  
Demuru, Elisa, 51  
Díaz González, Sergio, 31, 33, 40, 45, 60  
Dieng, Hamidou, 55  
Dolado, Ruth, 32, 47  
Dotras, Laia, 27, 33, 36, 46, 59  
Duarte, Miguel, 25  
Egeter, Bastian, 34  
Escribano Durán, Begoña, 23  
Esparza Baños, Manuel José, 31, 33, 60  
Fatjó, Jaume, 44, 53  
Feliu, Olga, 49  
Fernández García, Jennifer, 34  
Fernández-Lázaro, Gloria, 52  
Fernandes, Carlos, 25  
Ferreira da Silva, Maria Joana, 19, 25, 29, 34, 35, 50, 55  
Fidalgo de las Heras, Ana, 31, 33, 40, 45, 60  
Franquesa-Soler, Montserrat, 53  
Frazão-Moreira, A, 19  
Fuzessy, Lisieux, 36  
Galán-Plana, Carlota F, 33, 36, 46, 59  
Galbany, Jordi, 27, 29, 33, 36, 46, 57, 58, 59  
Galián, José, 42  
Gallego-Acero, María C, 46  
García-Cuesta, Marcel, 37, 56  
García-Saura, Helena, 30, 41  
Gázquez, José MM, 59  
Genera i Monells, Margarida, 38, 39  
Giberga, Albert, 39  
Gil-Dolz, Jose, 40  
Gimeno, Elisabet, 32  
Girard-Buttoz, Cédric, 26  
Godinho, Raquel, 34, 55  
González Bermejo, Paula, 31, 40, 45  
Guillén-Salazar, Federico, 19, 22, 41, 52  
Guinot, Melissa, 30, 41  
Hernandez-Aguilar, R. Adriana, 27, 33, 36, 46, 59  
Herrero Reyes, Antonio Andrés, 42  
Herridge, Harriet R, 57  
Hockings, Kimberley J, 57  
Jaló, Maimuna, 57  
Jesus, Gonçalo, 28, 42  
Joosten, Marc, 32  
Kalcher-Sommersguter, Elfriede, 49, 54  
López-Leal, Kevin, 45  
Lee, Phyllis, 16  
Leendertz, Fabian, 25, 57  
Llana, Manuel, 27, 33, 36, 46, 59  
Llorente, Miquel, 24, 30, 39, 41, 43, 44, 48, 51, 52, 53, 54, 59, 61  
Luján Rodríguez, María Alicia, 31, 40, 45



- MacIntosh, Andrew JJ, 19  
Mármol, Laura, 32, 47  
Macanás-Martínez, Emilio, 19  
Macina, Samba, 46  
Marcos-Nistal, Marta, 46  
Marques, Guilherme, 25  
Martí de Ahumada, Blanca, 48  
Martínez Mendizábal, Ignacio, 56  
Martínez Gutiérrez, Raquel, 48  
Masip, Martí, 49  
Maté, Carme, 49  
Merino-Sánchez, Iria, 49  
Meunier, Hélène, 32, 47  
Minhós, Tânia, 19, 25, 29, 34, 35, 50  
Miralles Alvarez, Anna Maria, 20  
Mirghani, Nadia, 27, 33, 59  
Mundry, Roger, 26  
Murhula Masirika, Leandre, 65  
Narvaez, Daniela, 20  
Nash, Stephen D, 16  
Ndiaye, Papa I, 46  
Nhaga, Luís, 50  
Norscia, Ivan, 30, 51  
Ocunski, Dmitry, 44, 52  
Olivé, Mireia, 32  
Oliveira, Rúben, 25  
Orient Pérez, Ester, 22, 52  
Ortín, Sara, 39  
Ostos-Ruano, Ana, 53  
Padrell, Maria, 39, 53, 54  
Pardo, Gema, 42  
Parreira, Bárbara, 25  
Pascual, Arnau, 54  
Pasqualotto, Altea, 30, 51  
Pastor, Juan Francisco, 22, 37, 56  
Patrono, Livia V, 57  
Peña Bucheli, Alejandro, 20  
Pérez-Cembranos, Ana, 49  
Pérez-Pérez, Alejandro, 58  
Perri, Annarita, 30  
Pizzigalli, Cristian, 55  
Pons-Salvador, Gemma, 41  
Potau, Josep Maria, 22, 37, 56  
Pou, Toni, 16  
Puche, Carles, 48  
Puga-Gonzalez, Ivan, 17  
Quirós-Sánchez, Amara, 56  
Ramon, Marina, 57  
Ramos, C, 19  
Razgour, Orly, 55  
Renelies-Hamilton, Justinn, 36, 59  
Riba Campos, Carles-Enric, 29  
Riba, David, 40, 45, 54  
Rivera Rey, David, 23  
Rodríguez, Morena, 57  
Rodríguez, Renata, 20  
Romero, Alejandro, 58  
Rostán, Carles, 44  
Sá, Rui, 50  
Sánchez Rodríguez, Susana María, 31

Sánchez-Andrés, Ángeles, 56  
Sánchez-López, Sònia, 34, 49  
Sánchez-Megías, Andreu, 36, 59  
Sampaio-Dias, S, 35  
Sanhá, Américo, 57  
Sevastópska, Darya, 50  
Simó, Laura, 44  
Sol, Daniel, 36  
Sommer, Volker, 17, 42  
Soto, Cristina, 59  
Sow, Andack Saad, 55  
Sticea Covaciu, Andra Paula, 31, 33, 60  
Swaray, M, 66  
Tamia Torres, Camila, 20  
Torrijo-Boix, Stephanie, 58  
Tung, Jenny, 57  
Turay, Brima, 19, 50  
Ubach-Tarrés, Montserrat, 60  
Úbeda, Yulán, 39, 44  
Vélez del Burgo, Itsaso, 44  
Valdivieso, Sara, 24, 61  
Valladares, Francisco, 20  
Velasco, Andrea, 57  
Vera, Karla, 20  
Veracini, Cecilia, 50, 60, 61  
Verdú, Miguel, 36  
Viter, Victoria, 20  
Wittig, Roman, 25, 26  
Xu, Zhihong, 19  
Zapata, Josefina, 23, 26, 42